HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY
CHAPTER 49		
L.E.P. 1- 7	Revised to Reflect this revision indicating new,revised, and/or deleted pages	
T. OF C. 2- 4, 9	Revised to reflect this revision	
49-00-00 534- 536	Minor additions and amplification **ADDED: REF. TO ILLUSTRATIONS**	
49-10-00 401- 403, 405, 408, 412- 424	Layout Improved or Effectivity Updated	
49-10-00 902	Minor additions and amplification **AMENDED: CROSS REF.**	
49-12-00 601, 603- 606	Layout Improved or Effectivity Updated	
49-13-00 601- 604	Minor additions and amplification **AMENDED: CODE ILLUSTRATION**	
49-13-11 401	Layout Improved or Effectivity Updated	
49-20-00 305	Minor additions and amplification **DELETED: TWO LINES**	
49-31-14 302- 305	Layout Improved or Effectivity Updated	
49-51-00 13	Layout Improved or Effectivity Updated	
49-81-15 601	Minor additions and amplification **IN COMPLIANCE WITH AUTHORING GUIDES**	

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CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY
49-91-13	Minor additions and amplification	
201- 204	ILLUSTRATION CODE AMENDED	
49-93-00	Minor additions and amplification	
601	R01: TO INCLUDE THE REFERENCE FOR THE MPD TASK 499100-01	

CHAPTER 49

AIRBORNE AUX. POWER

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively
Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary

CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE	CH/SE/SU	C	PAGE	DATE
RECORD				49-00-00		27	Jun01/08	49-00-00		537	Jun01/03
OF TEMP.				49-00-00		28	Jun01/08	49-00-00		538	Jun01/03
REVISION				49-00-00		29	Jun01/08	49-00-00		539	Jun01/03
				49-00-00		30	Jun01/08	49-00-00		540	Jun01/03
L.E.P.	R	1- 7	Jun01/10	49-00-00		31	Jun01/08	49-00-00		541	Jun01/05
T. of C.		1	Jun01/08	49-00-00		32	Jun01/08	49-00-00		542	Jun01/03
T. of C.	R	2	Jun01/10	49-00-00		501	Jun01/08	49-00-00		543	Jun01/03
T. of C.	R	3	Jun01/10	49-00-00		502	Jun01/08	49-00-00		544	Jun01/03
T. of C.	R	4	Jun01/10	49-00-00		503	Jun01/03	49-00-00		545	Jun01/03
T. of C.		5	Jun01/09	49-00-00		504	Jun01/03	49-00-00		546	Jun01/06
T. of C.		6	Jun01/09	49-00-00		505	Jun01/03	49-00-00		547	Jun01/06
T. of C.		7	Jun01/09	49-00-00		506	Jun01/09	49-00-00		548	Jun01/06
T. of C.		8	Jun01/09	49-00-00		507	Jun01/04	49-00-00		549	Jun01/09
T. of C.	R	9	Jun01/10	49-00-00		508	Jun01/09	49-00-00		550	Jun01/06
T. of C.		10	Jun01/09	49-00-00		509	Jun01/03	49-00-00		551	Jun01/06
				49-00-00		510	Jun01/09	49-00-00		552	Jun01/06
49-00-00		1	Jun01/08	49-00-00		511	Jun01/03	49-00-00		553	Jun01/06
49-00-00		2	Jun01/08	49-00-00		512	Jun01/09	49-00-00		554	Jun01/06
49-00-00		3	Jun01/08	49-00-00		513	Jun01/03	49-00-00		555	Jun01/06
49-00-00		4	Jun01/08	49-00-00		514	Jun01/09	49-00-00		556	Jun01/09
49-00-00		5	Jun01/08	49-00-00		515	Jun01/09	49-00-00		701	Dec01/90
49-00-00		6	Jun01/08	49-00-00		516	Jun01/09	49-00-00		702	Dec01/90
49-00-00		7	Jun01/08	49-00-00		517	Jun01/04	49-00-00		703	Dec01/90
49-00-00		8	Jun01/08	49-00-00		518	Jun01/03	49-00-00		704	Dec01/90
49-00-00		9	Jun01/08	49-00-00		519	Jun01/09	49-00-00		705	Dec01/90
49-00-00		10	Jun01/08	49-00-00		520	Jun01/09	49-00-00		706	Dec01/90
49-00-00		11	Jun01/08	49-00-00		521	Jun01/09	49-00-00		707	Dec01/90
49-00-00		12	Jun01/08	49-00-00		522	Jun01/03	49-00-00		708	Dec01/90
49-00-00		13	Jun01/08	49-00-00		523	Jun01/09	49-00-00		709	Dec01/90
49-00-00		14	Jun01/08	49-00-00		524	Jun01/09	49-00-00		710	Dec01/90
49-00-00		15	Jun01/08	49-00-00		525	Jun01/09	49-00-00		711	Dec01/90
49-00-00		16	Jun01/08	49-00-00		526	Jun01/07	49-00-00		712	Dec01/90
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49-00-00		18	Jun01/08	49-00-00		528	Jun01/03	49-00-00		714	Dec01/90
49-00-00		19	Jun01/08	49-00-00		529	Jun01/03				
49-00-00		20	Jun01/08	49-00-00		530	Jun01/03	49-10-00		1	Dec01/90
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49-00-00		22	Jun01/08	49-00-00		532	Jun01/06	49-10-00		3	Dec01/90
49-00-00		23	Jun01/08	49-00-00		533	Jun01/03	49-10-00	R	401	Jun01/10
49-00-00		24	Jun01/08	49-00-00	R	534	Jun01/10	49-10-00	R	402	Jun01/10
49-00-00		25	Jun01/08	49-00-00	R	535	Jun01/10	49-10-00	R	403	Jun01/10
49-00-00		26	Jun01/08	49-00-00	R	536	Jun01/10	49-10-00		404	Jun01/08

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49-10-00	R	405	Jun01/10
49-10-00		406	Jun01/06
49-10-00		407	Dec01/06
49-10-00	R	408	Jun01/10
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49-10-00	R	412	Jun01/10
49-10-00	R	413	Jun01/10
49-10-00	R	414	Jun01/10
49-10-00	R	415	Jun01/10
49-10-00	R	416	Jun01/10
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49-31-14	R	302	Jun01/10
49-31-14	R	303	Jun01/10
49-31-14	R	304	Jun01/10
49-31-14	R	305	Jun01/10
49-31-14	D	306	
49-31-21		401	Jun01/99
49-31-21		402	Jun01/99

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49-31-21		403	Jun01/99
49-31-21		404	Jun01/99
49-31-21		405	Jun01/99
49-31-21		406	Jun01/99
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APU Fuel Feed System			11	ALL
APU Fuel System			11	ALL
Component Description			11	ALL
Operation			15	ALL
FUEL DISTRIBUTION	49-31-00			
Adjustment/Test			501	ALL
Operational Test			501	ALL
Functional Test			510	ALL
Inspection/Check			601	ALL
PRIMARY FUEL MANIFOLD AND NOZZLE	49-31-12			
Maintenance Practices			201	ALL
Removal/Installation			201	ALL
Functional/Test			205	ALL

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SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
SECONDARY FUEL MANIFOLD AND NOZZLE	49-31-13			
Maintenance Practices			201	ALL
FUEL FILTER	49-31-14			
Servicing			301	ALL
APU FUEL FEED LINE	49-31-21			
Removal/Installation			401	ALL
FUEL CONTROL UNIT	49-32-11			
Removal/Installation			401	ALL
FUEL FLOW DIVIDER AND DRAIN VALVE	49-32-12			
Maintenance Practices			201	ALL
Solenoid Valve and Check Valves			201	ALL
Removal/Installation			201	ALL
Removal/Installation			401	ALL
APU PUMP (8QC)	49-32-13			
Removal/Installation			401	ALL
APU PUMP CANISTER	49-32-14			
Removal/Installation			401	ALL
APU FUEL PUMP PRESSURE SWITCH	49-32-15			
Removal/Installation			401	ALL
DIFFERENTIAL PRESSURE INDICATOR	49-32-16			
FUEL FILTER BY-PASS VALVE				
Removal/Installation			401	ALL
FUEL SOLENOID VALVE	49-32-17			
Removal/Installation			401	ALL
APU ISOLATION VALVE (11QF)	49-33-11			
Removal/Installation			401	ALL
Deactivation/Reactivation			901	ALL
Ref. MMEL Section 1-49, Item 2			901	ALL
LOW PRESSURE VALVE (12QF)	49-33-12			
Removal/Installation			401	ALL
Deactivation/Reactivation			901	ALL
Failure of Low Pressure Valve			901	ALL
Ref. MMEL Sect. 1-49, Item 12 (LP Valve)			901	ALL
APU FUEL LOW PRESSURE SWITCH (2KE)	49-34-11			
Removal/Installation			401	ALL
Inspection/Check			601	ALL
IGNITION AND STARTING	49-40-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			2	ALL
Description			9	ALL
Operation			10	ALL
IGNITION UNIT	49-41-11			
Removal/Installation			401	ALL
IGNITER PLUG ELECTRICAL LEAD	49-42-11			
Removal/Installation			401	ALL

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
IGNITER PLUG	49-42-12			
Maintenance Practices			201	ALL
Removal/Installation			201	ALL
Inspection			205	ALL
Cleaning			207	ALL
STARTER MOTOR	49-42-13			
Maintenance Practices			201	ALL
Removal/Installation			201	ALL
Functional Test			204	ALL
STARTER SPRAG CLUTCH	49-42-14			
Removal/Installation			401	ALL
AIR	49-50-00			
Description and Operation			1	ALL
BLEED AND SURGE AIR	49-51-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			5	ALL
Component Description			6	ALL
Operation			13	ALL
APU BLEED LOAD VALVE	49-51-11			
Removal/Installation			401	ALL
Deactivation/Reactivation			901	ALL
REF. MMEL Section 1-36, Item 17 (FAA only)			901	ALL
SURGE CONTROL VALVE	49-51-13			
Maintenance Practices			201	ALL
Surge Control Valve			201	ALL
Removal/Installation			201	ALL
Surge Control Valve Filter			204	ALL
Removal/Installation			204	ALL
Surge Control Valve			206	ALL
Adjustment/Test			206	ALL
TOTAL PRESSURE SENSOR	49-51-14			
Removal/Installation			401	ALL
STATIC PRESSURE SENSOR	49-51-15			
Removal/Installation			401	ALL
SURGE AIR DUCT	49-51-16			
Removal/Installation			401	ALL
SURGE/BLEED DUCT	49-51-17			
Removal/Installation			401	ALL
DELTA PRESSURE TRANSDUCER	49-51-18			
Removal/Installation			401	ALL
TOTAL PRESSURE TRANSDUCER (PT)	49-51-19			
Removal/Installation			401	ALL
COMPRESSOR INLET PRESSURE SENSOR	49-51-21			
Removal/Installation			401	ALL
FLOW SENSING MODULE	49-51-22			
Removal/Installation			401	ALL

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
ACCESSORY COOLING	49-52-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			1	ALL
Operation			4	ALL
COOLING FAN	49-52-11			
Removal/Installation			401	ALL
OIL COOLER OUTLET DUCT	49-52-14			
Removal/Installation			401	ALL
COOLING FAN SHUTOFF VALVE	49-52-17			
Removal/Installation			401	ALL
Cleaning/Painting			701	ALL
ENGINE CONTROLS	49-60-00			
Description and Operation			1	ALL
POWER CONTROL	49-61-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			2	ALL
Description			9	ALL
Electronic Control Box (ECB)			9	ALL
Speed Control			14	ALL
IGV Control			19	ALL
Surge Control			19	ALL
ECB BITE System			25	ALL
Protective Shutdowns			28	ALL
Air Intake Flap (INLET DOOR)			31	ALL
Reverse Compressor Air Flow (RVRSE FLOW)			32	ALL
Start Period Timer (SLOW START)			32	ALL
Clogged Generator Oil Filter (GEN FILTER)			32	ALL
Shutdown Circuit (S/D CKT)			32	ALL
Loss of DC Power (LOSS DC PWR)			32	ALL
ECB			32	ALL
Overcurrent (O'CURR)			33	ALL
Generator High Oil Temperature (GEN HOT)			33	ALL
Operation			35	ALL
ELECTRONIC CONTROL BOX (59KD)	49-61-11			
Removal/Installation			401	ALL
HOURMETER (54KD)	49-61-21			
Removal/Installation			401	ALL
START COUNTER (73KD)	49-61-22			
Removal/Installation			401	101-200,
APU EMERGENCY SHUTDOWN	49-62-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
Description			5	ALL
Operation			9	ALL
Adjustment/Test			501	ALL
INDICATING	49-70-00			
Description and Operation			1	ALL
General			1	ALL
ECAM System and Warning Display			7	ALL
POWER INDICATING	49-71-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			7	ALL
Operation			9	ALL
SPEED SENSOR	49-71-13			
Removal/Installation			401	ALL
TEMPERATURE INDICATING	49-72-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			1	ALL
Operation			7	ALL
EXHAUST THERMOCOUPLE	49-72-11			
Maintenance Practices			201	ALL
Removal/Installation			201	ALL
Inspection			203	ALL
ANALYZERS	49-73-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			4	ALL
Operation			5	ALL
EXHAUST	49-80-00			
Description and Operation			1	ALL
Component Location			1	ALL
EXHAUST MUFFLER AND SEALING RING	49-81-15			
Removal/Installation			401	ALL
Inspection Check			601	ALL
OIL SYSTEM	49-90-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			2	ALL
Description			9	ALL
Operation			10	ALL
Servicing			301	ALL
OIL FILTER	49-91-12			
Maintenance Practices			201	ALL
Inspection/Check			204	ALL

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SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
Cleaning			205	ALL
MAGNETIC/DRAIN PLUG	49-91-13			
Maintenance Practices			201	ALL
Removal/Installation			201	ALL
Inspection/Check			204	ALL
OIL PRESSURE RELIEF VALVE	49-91-14			
Removal/Installation			401	ALL
OIL COOLER	49-91-15			
Maintenance Practices			201	ALL
Temperature Control Valve			201	ALL
Removal/Installation			201	ALL
Removal/Installation			401	ALL
Cleaning/Painting			701	ALL
OIL PUMPS	49-91-16			
Removal/Installation			401	ALL
Engine Oil Pump			401	ALL
Generator Scavenge Pump			406	ALL
NORMALLY CLOSED SOLENOID (DE-OIL) VALVE	49-91-17			
Removal/Installation			401	ALL
DIFFERENTIAL PRESSURE INDICATORS	49-91-19			
Removal/Installation			401	ALL
Differential Pressure Indicator - Generator Scavange Pump Filter Housing			401	ALL
Differential Pressure Indicator - Lube Pump			403	ALL
DIFFERENTIAL PRESSURE SWITCH	49-91-21			
Removal/Installation			401	ALL
FILTER PRESSURE REGULATING BYPASS AND OIL PRESSURE REGULATING VALVES	49-91-22			
Removal/Installation			401	ALL
Filter Pressure Regulating Bypass Valve Generator Scavenge Pump Filter Housing			401	ALL
Oil Pressure Regulating Valve - Lube Pump			404	ALL
OIL INDICATING	49-93-00			
Description and Operation			1	ALL
General			1	ALL
Component location			1	ALL
Description			8	ALL
Operation			8	ALL
Inspection Check			601	ALL
Read APU Oil Level on Lateral Panel Indicator			601	ALL
OIL FILLER AND SIGHT GLASS HOUSING	49-93-13			
Removal/Installation			401	ALL
OIL QUANTITY SENSOR	49-93-16			
Removal/Installation			401	ALL

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SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
OIL LEVEL INDICATOR (50KK)	49-93-17			
Removal/Installation			401	ALL
LOW OIL PRESSURE AND HIGH OIL TEMPERATURE WARNING	49-94-00			
Description and Operation			1	ALL
General			1	ALL
Component Location			1	ALL
Description			5	ALL
Operation			5	ALL
Maintenance Practices			201	ALL
Oil Sensor Manifold, LOP and HOT Sensor Switch			201	ALL
Removal/Installation			201	ALL
OIL TEMPERATURE SWITCH	49-94-13			
Removal/Installation			401	ALL

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AIRBORNE AUXILIARY POWER UNIT
DESCRIPTION AND OPERATION

1. General

The Auxiliary Power Unit (APU), designated GTCP 331-250F or H, is a gas turbine engine manufactured by GARRETT AIRESEARCH MANUFACTURING DIVISION.
The APU which is located in the tailcone can be used on the ground or in flight. It is normally considered NONESSENTIAL equipment but may be required when ETOPS are carried out.
An Electronic Control Box (ECB), which is located at the rear of the cabin is a microprocesser based unit which controls and monitors the operation of the APU.
APU starting and shutdown is initiated on the overhead panel in the cockpit.
Additional EMERGENCY shutdown can be done with external switches located at the nosewheel and the refuel/defuel panel.
A fire detection and extingushing system is fitted in the APU compartment.
Detection of a fire is indicated on the ECAM system and the APU fire warning panel. Manual operation of the APU fire handle is also done on this panel.(Ref. 26-13-00 and 26-22-00).

2. Description (Ref. Fig. 001, 002)

(Ref. Fig. 001, 002)
The auxiliary power unit system consists of the following subsystems:

A. Power Plant (Ref. 49-10-00)

The APU power plant is installed in the fuselage tailcone, aft of FR95. It is suspended by a three-point, shock-mounted, suspension system within a fireproof compartment. Provisions are made for hoisting or lowering the engine/gearbox unit, complete with accessories and/or generator, through a pair of outward-hinged doors on the underside of the fuselage.

B. APU Mounts (Ref. 49-12-00)

The APU is suspended at three points by tie-rods. In order to protect the structure against vibrations of the APU and reduce the flow of aircraft vibrations and shocks into the APU, shock mounts are provided between the tie-rods and APU. The three APU mounts are attached to the fireproofed APU compartment at FR95, FR97, FR98 and FR99.
The mounts are attached to the APU with brackets.

C. Fire Seal (Ref. 49-13-00)

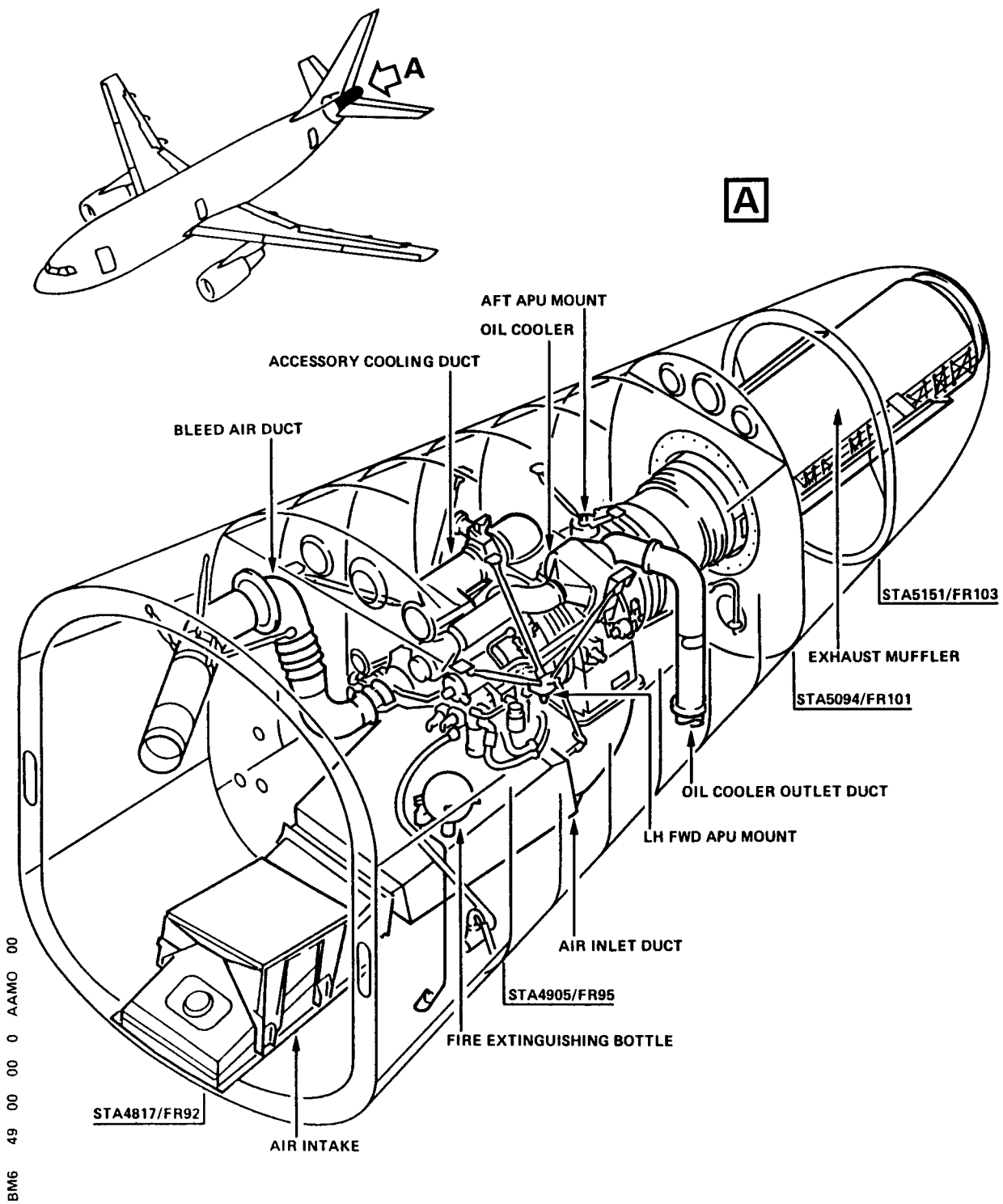
The APU compartment is designed as a fireproof box with a front (FR95) and a rear (FR101) fire wall. The rear fire wall is provided with a fire seal around the exhaust muffler.

D. Air Intake (Ref. 49-16-00)

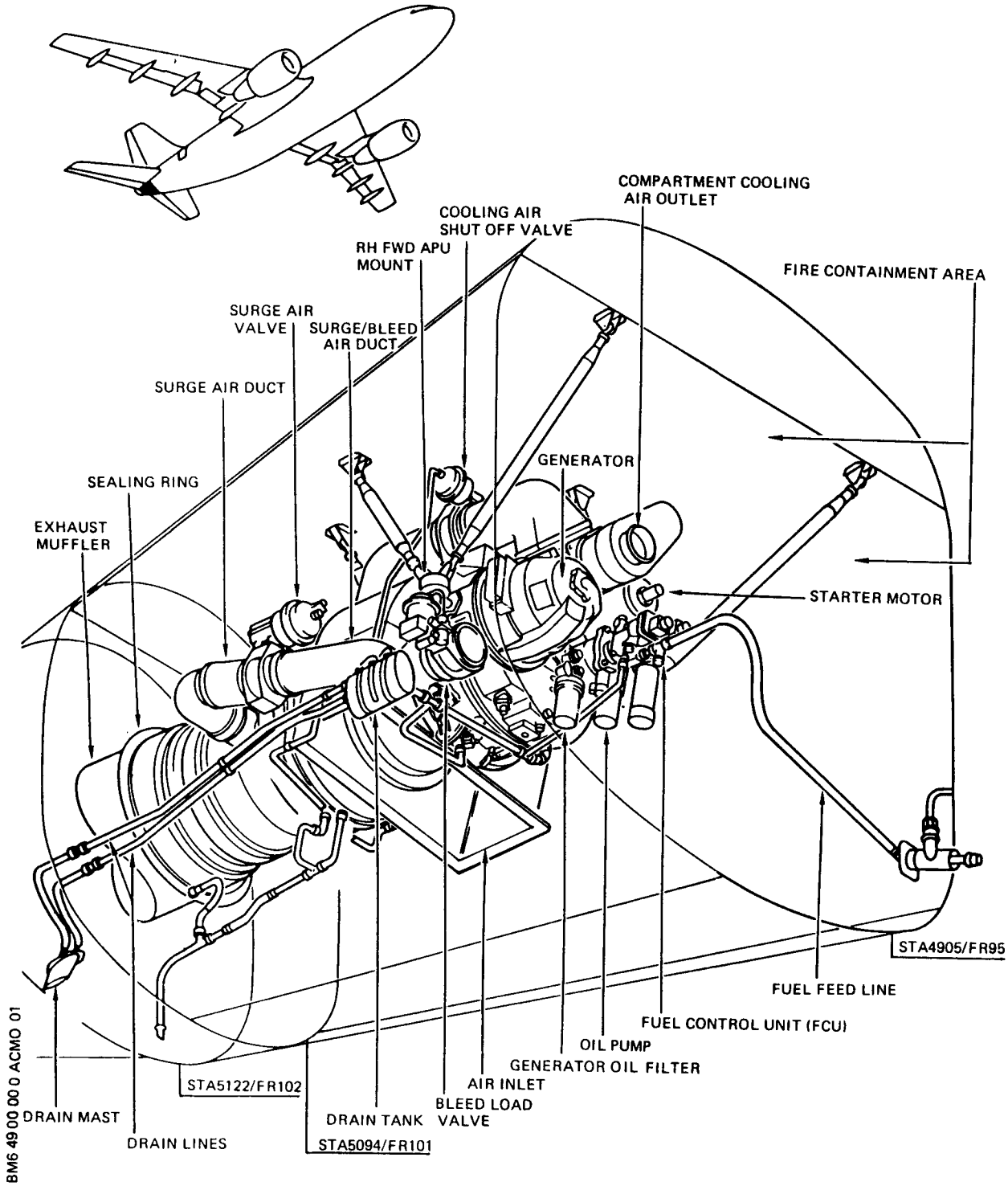
The air intake system directs ambient air to the APU plenum chamber. The system includes the air intake, an inlet flap at the bottom of the fuselage in front of FR92 and an air inlet duct consisting of a diffuser and an elbow between FR92 and the APU plenum chamber.

E. Drain System (Ref. 49-17-00)

A drain system is installed on the APU where it is necessary to evacuate fuel, oil, water and air. It prevents the, possibly harmful, accumulation



Tail Cone Equipment - LH Side
Figure 001



Tail Cone Equipment - RH Side
Figure 002

of liquids in the APU bay. Water/fuel drains are run directly to the atmosphere. Fuel, oil and air drains are routed to a drain tank. The drain tank is exhausted by a suction line through the external drain mast which operates in flight, at speeds above 200 kt. The drain system is constructed of fully fireproofed components.

F. Engine (Ref. 49-20-00)
The gas turbine compressor power (GTCP) unit engine consists of three basic modules: power section, load compressor, and gearbox with accessories. The engine provides pneumatic power for main engine starting, pneumatic power for cabin air conditioning, shaft power to drive the electrical generator and cooling air to cool engine lubricating oil and APU compartment.

G. Load Compressor (Ref. 49-23-00)
The load compressor, which delivers compressed air to the aircraft pneumatic system, is attached directly to the power section and is directly driven from power section rotational speed.

H. Accessory Drive Gearbox (Ref. 49-26-00)
The engine gearbox module, located forward of the load compressor, incorporates provisions for mounting the aircraft electrical generator. In addition all required engine accessories, such as the lube pumps, cooling fan, fuel control unit, and electric engine starter motor are mounted on the gearbox. The gearbox contains five gear sets, consisting of a total of eight gears.

J. Engine Fuel and Control (Ref. 49-30-00)
(1) Fuel is delivered to the APU fuel system by the APU fuel feed system, which is connected to the aircraft main engine fuel feed system. The APU fuel feed system consists of an APU fuel feed pump, isolation valve, low pressure valve, feed line provided with a ventilated shroud, APU pump inlet pressure switch, APU inlet pressure switch, and shroud vent valve.
(2) The APU fuel system operates fully automatic and requires no external controls. The system consists of a fuel control unit, including a low pressure (inlet) filter, high pressure filter, fuel flow divider and drain valve, fuel manifolds and nozzles and appropriate lines and hoses interconnecting the components.

K. Ignition and Starting (Ref. 49-40-00)
The ignition and starting system provides the means of rotating the engine to starting speed and for igniting the fuel-air mixture in the engine combustion chamber. The system consists of an engine starter motor, ignition unit igniter plug and an igniter plug electrical lead.

L. Bleed and Surge Air (Ref. 49-51-00)
The bleed load air, which is delivered by the load compressor, is ducted to the aircraft pneumatic system via the bleed load valve. When no APU air is required, with APU running, the bleed load valve shuts and the air is routed to the APU exhaust passing through the surge air valve.

M. Accessory Cooling (Ref. 49-52-00)

The accessory cooling system provides air to the oil cooler and the APU compartment for cooling and ventilation.

N. Engine Controls (Ref. 49-60-00)
The engine control system consists of manual and automatic controls for starting, shutdown, and maintaining the APU within safe limits during operation.

P. Power Control (Ref. 49-61-00)
The APU power control provides a means for starting, shutdown and maintaining engine operation within safe limits. The APU power control consists of the electronic control box (ECB), and the fuel control unit (FCU).

Q. Emergency Shutdown (Ref. 49-62-00)
In addition to normal shutdown, the APU is protected by an automatic shutdown system which responds to certain system malfunctions and to an emergency switch signal conditioner which processes manual external shutdown switch signals or automatic fire detection shutdown signals. An emergency shutdown of the APU occurs when a ground signal is transmitted to the Electronic Control Box (ECB) EMERGENCY STOP input.

R. Indicating (Ref. 49-70-00)
The APU indicating system is designed to provide information about APU parameters for operation and maintenance purposes. Most of the indicators are installed on the APU maintenance panel 472VU. Additionally, the operational parameters are provided via ECAM.

S. Power Indicating (Ref. 49-71-00)
Two separate speed sensors are protruding into the air inlet plenum chamber to monitor the APU spool speed. Each sensor produces a signal frequency which is proportional to the RPM. In the Electronic Control Box (ECB), the signals are converted into signal currents and compared. Only the higher current is directed to a current driver which controls the current flow to the RPM indicator. Additionally, various control and shutdown functions are influenced by this system.

T. Temperature Indication (Ref. 49-72-00)
Two separate thermocouple rakes are installed at the APU tail pipe to monitor the APU exhaust gas temperature EGT. Each rake produces a signal voltage proportional to the exhaust gas temperature. The voltage signals are amplified and compared in the ECB. Only the higher signal is directed to a current driver which controls the current flow to the EGT-indicator. Additionally, various control and shutdown functions are influenced by this system.

**ON A/C 001-100,

U. Analyzer (Ref. 49-73-00)
An analysis of the APU operation time is provided by an hourmeter and an analysis of APU failure is facilitated by the Build-In-Test-Equipment

(BITE) system controlled by the Electronic Control Box (ECB). The BITE system is incorporated in the ECB and is displayed on the ECB front panel.

**ON A/C 101-200,

U. Analyzer (Ref. 49-73-00)
An analysis of the APU operation time is provided by an hourmeter and a start-cycle counter (event counter). An analysis of APU failure is facilitated by the Built-in Test Equipment (BITE) system controlled by the Electronic Control Box (ECB). The BITE system is incorporated in the ECB and is displayed on the ECB front panel.

**ON A/C ALL

V. Exhaust (Ref. 49-80-00)
The APU exhaust system conducts APU exhaust gas to the atmosphere and muffles the exhaust noise. The exhaust system is accomodated in the tail cone between FR101 and the end of the fuselage. The extension at the rear fire wall FR101 is designed to provide a sealed fireproof connection (Ref. 49-13-00).

W. Oil (Ref. 49-90-00)
The APU utilizes an integral wet sump lubrication system for lubricating and cooling the electrical generator and accessory gearbox. The lubrication system is comprised of two distribution circuits, the external and internal. The APU oil external disribution system also includes an oil cooler with a thermal bypass valve. The APU oil system includes the oil pump, oil filter elements, magnetic/drain plug, generator scavenge pump, the normally closed (N/C) solenoid valve, a turbine bearing scavenge pump, and the oil system indication.

X. Oil Indicating (Ref. 49-93-00)
The oil indicating system is designed to sense and monitor the APU's oil level. The system consists of an oil level indicator and an oil level transmitter. A static and dynamic operation mode is provided, to compensate for the change in sump oil level during APU running.

Y. Low Oil Pressure and High Oil Temperature Warning (Ref. 49-94-00).
In case of Low Oil Pressure (LOP) or high oil temperature (HOT) an amber fault light illuminates on the overhead APU control panel 429VU. Simultaneously an automatic APU shutdown is initiated, associated with the illumination of the MASTER CAUTION light and a single stroke chime audio warning.

3. Operation
A. Operation of APU
Engine start is initiated from the APU panel 429VU when the MASTER SW 14KD is set to ON, and the start switch is pressed. With the MASTER SW in ON

position the Electronic Control Box (ECB) and the APU boost pump are energized, and the fuel isolation valves opens. The engine starter motor does not engage unless the air inlet flap is open.

At approximately seven percent speed, the ECB energizes the igniter, opens the fuel solenoid valve on the fuel control, and establishes the correct metered fuel level for engine light-off. Fuel, flowing from the fuel control to the flow divider, and the Inlet Guide Vane (IGV) actuator, control engine speed during acceleration.

The EGT meter will continue to display a constant temperature rise as the engine accelerates with engine starter motor assistance to approximately 50 percent speed.

At 50 percent speed, the ECB de-energizes the engine starter motor. There will be a steady decrease in EGT as the engine accelerates to 100 percent speed. This deliberate and constant engine acceleration results from the control action of the timed acceleration sequence, programmed within the ECB.

Throughout the acceleration cycle, the ECB continues to command the Inlet Guide Vane Actuator (IGVA) to position load compressor inlet guide vanes to the fully closed position. This assures minimum flow through the load compressor and minimizes shaft loading on the engine during start.

When the engine has reached governed speed and is ready to carry load, the ECB sends a greater than or equal to 95 percent signal to the aircraft circuits, which then become active. Placing the APU BLEED switch on AIR BLEED panel 436VU to OPEN, allows compressed air to flow through the aircraft system bleed air duct, from the engine in quantities determined by the selected pneumatic load. Electrical load may be applied to the engine by exciting the gearbox mounted generator field and placing the generator on line. When the engine is loaded by one or both of the above methods, a temperature increase will be evident, indicated on the engine EGT meter.

During the engine start sequence, the IGV are held shut. Once 95 percent speed has been attained, the IGV assume a position that corresponds to the required pneumatic flow. This level is computed by the ECB using the pneumatic command signals. Should the combined electrical and pneumatic load cause the engine to exceed the predetermined temperature limit, the ECB will command the inlet guide vanes to modulate partially closed from the selected position, thus reducing the pneumatic load and giving priority to the electrical load.

A normal engine stop is initiated when setting the MASTER SW on APU panel 429VU from ON to OFF. When this occurs, the ECB immediately sends a shutdown command to the aircraft circuits. Simultaneously, the ECB removes the 95 percent signal causing the bleed air valve to close. With pneumatic loads removed, the engine goes into a cool-down cycle as evidenced by a decrease in indicated temperature on the EGT meter. After approximately 15 seconds, the EGT meter will show a slight momentary upscale deflection as the ECB automatically tests its own overtemperature shutdown protective circuits. The cool-down cycle then continues from 0 to 120 seconds as determined by adjustments, before shutdown actually occurs.

During the engine shutdown cycle, which is part of the normal STOP sequence, the ECB continues to function and maintain an engine shutdown signal to the aircraft circuits. This signal is maintained until the engine has decreased speed to less than seven percent, at which time an engine

shutdown signal is provided by the ECB. This causes aircraft circuits to de-energize the dc fuel boost pump and aircraft fuel isolation valve. The preceding sequences describe a normal engine start-run-stop cycle. In an abnormal system malfunction condition, the ECB continuously provides safety, monitoring and protective functions to either shut down the engine, or to provide a visual indication. Thus any condition that would harm the engine will automatically be detected by the ECB, which will cause the engine to unload and immediately shut down. This condition is indicated by the APU panel FAULT lamp that will come on and remain on until the MASTER SW is placed to OFF.

B. Control and Indication
(Ref. Fig. 003)

**ON A/C 001-100,

(Ref. Fig. 004)

**ON A/C 101-200,

(Ref. Fig. 005)

**ON A/C ALL

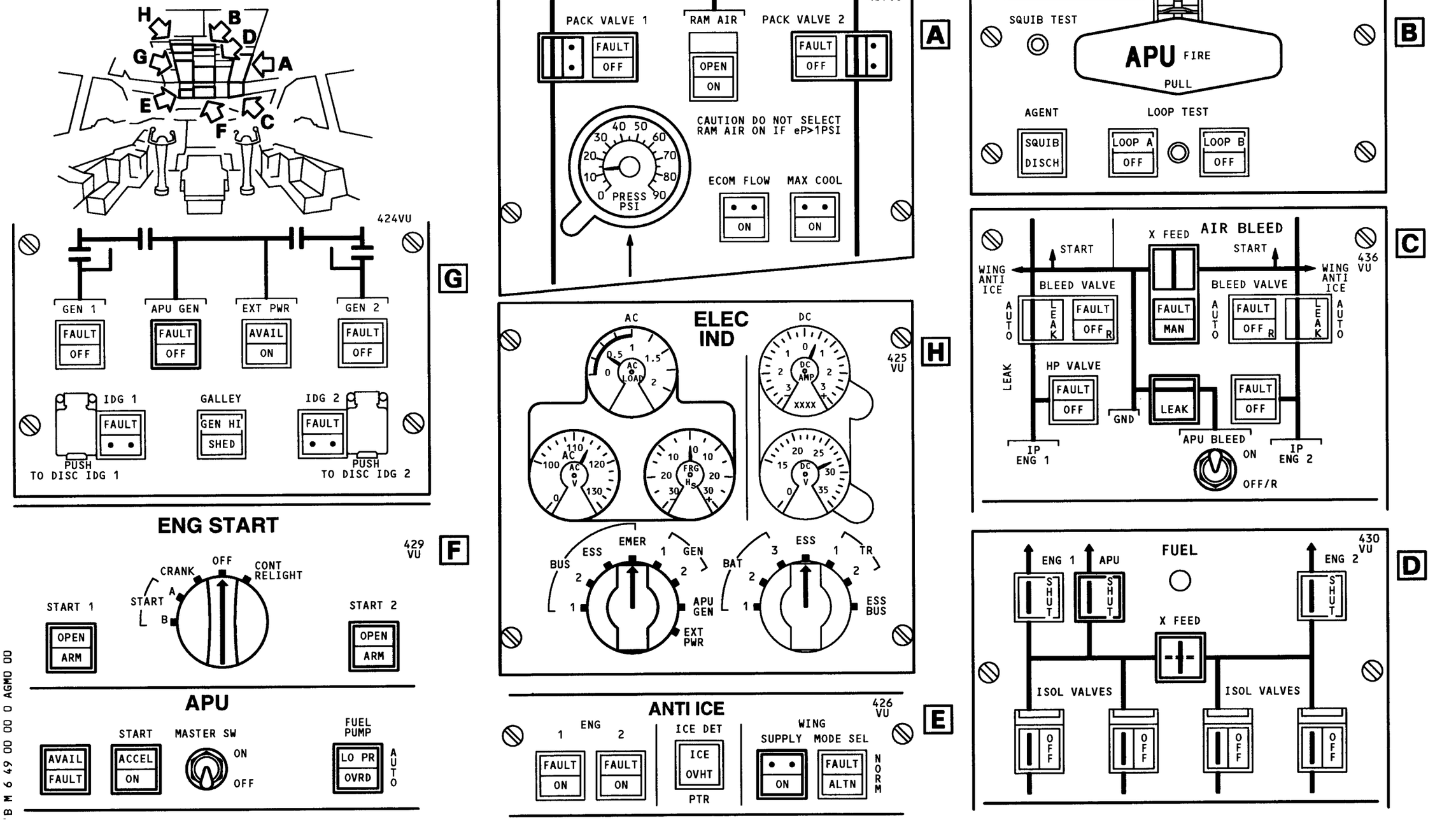
(Ref. Fig. 006)
(Ref. Fig. 007)
(1)Cockpit Panel Layout
The APU controls and indicators are laid out at three locations within the cockpit as follows:
- Overhead panel, contains the system instruments required for operation.
(Ref. Fig. 008)
(Ref. Fig. 009)
(Ref. Fig. 010)
(Ref. Fig. 011)
(Ref. Fig. 012)
(Ref. Fig. 013)
(Ref. Fig. 014)
(Ref. Fig. 015)
(Ref. Fig. 016)
- Maintenance panel, contains the system instruments needed for maintenance operations.

**ON A/C 001-100,

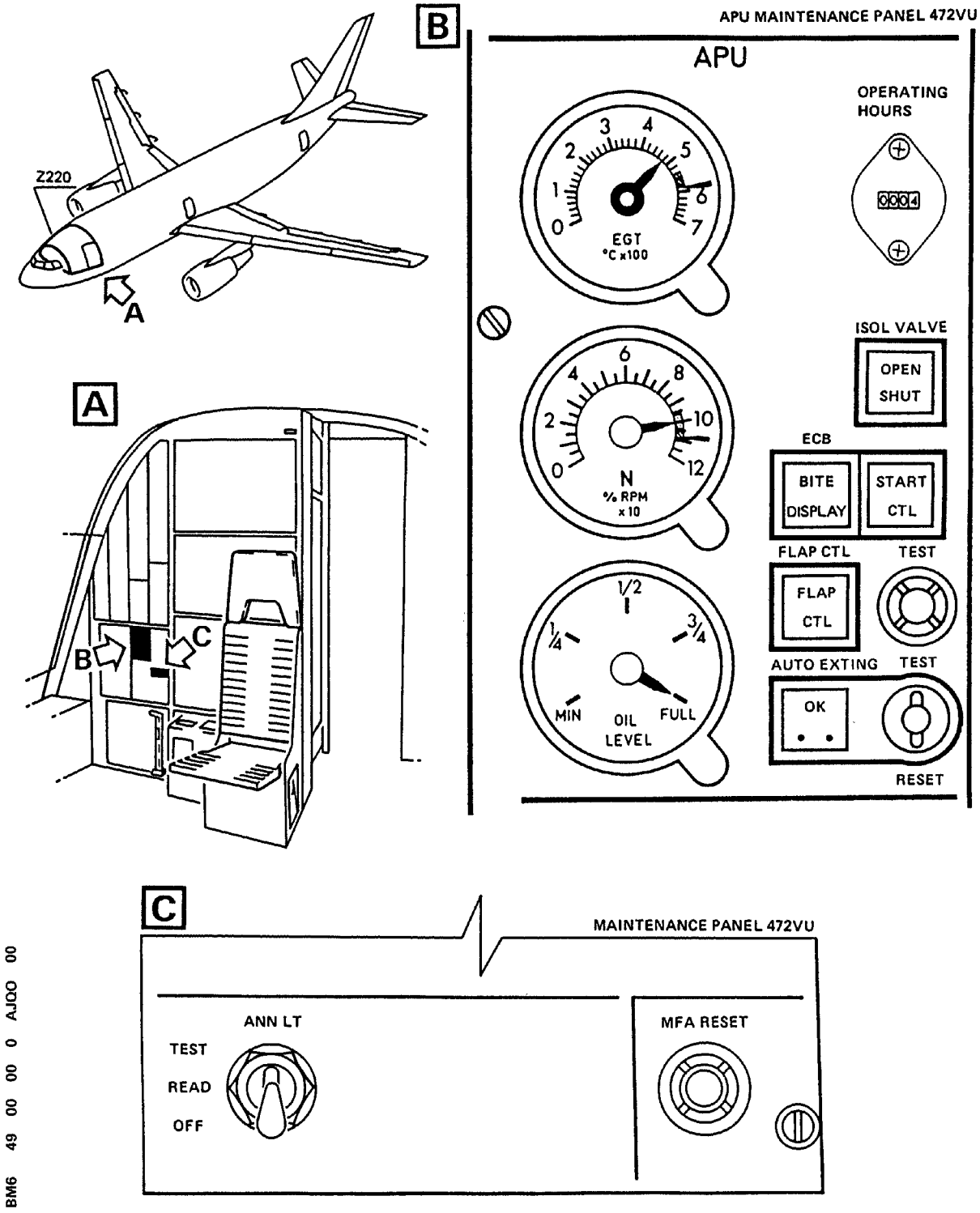
(Ref. Fig. 017)

**ON A/C 101-200,

(Ref. Fig. 018)

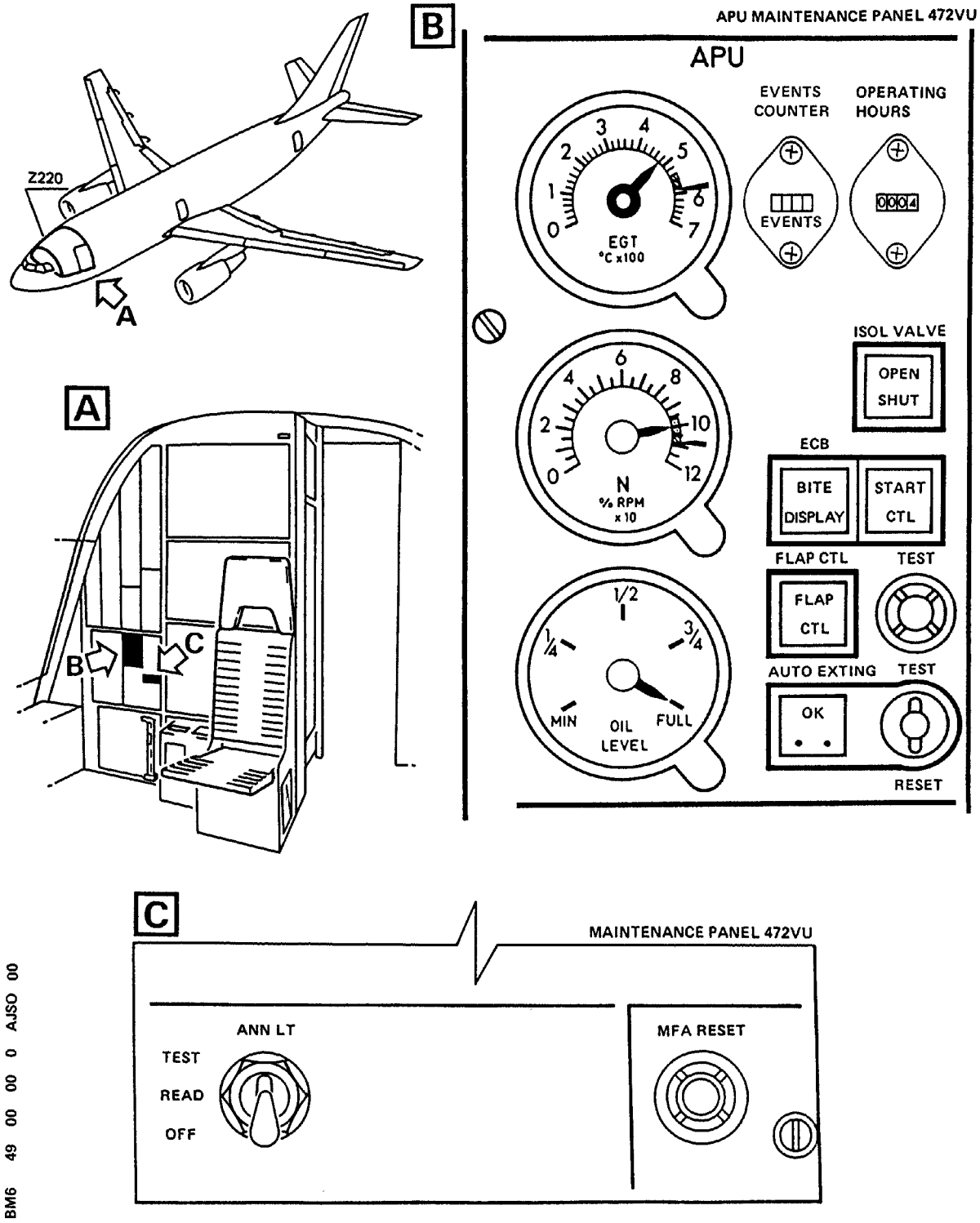


APU Controls on Overhead Panel
Figure 003



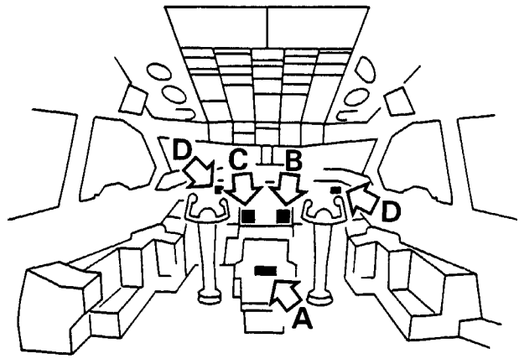
BM6 49 00 00 0 AJQO 00

APU Controls on Maintenance Panel
Figure 004



BM6 49 00 00 0 AJSO 00

APU Controls on Maintenance Panel
Figure 005



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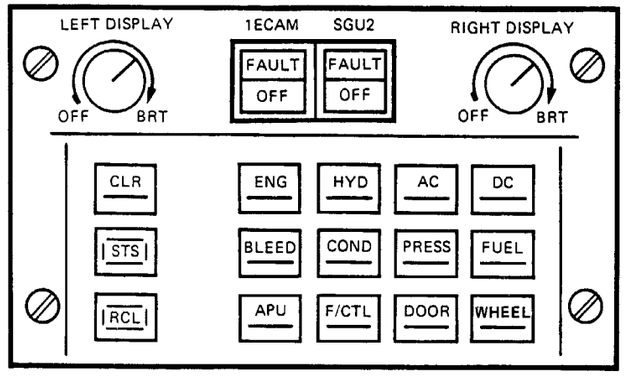
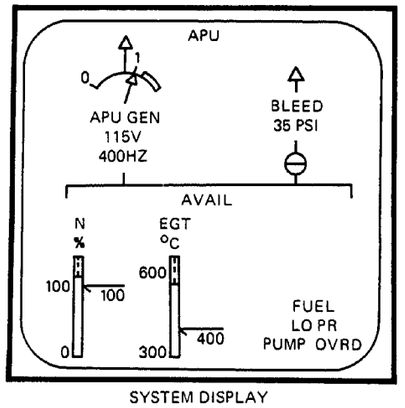
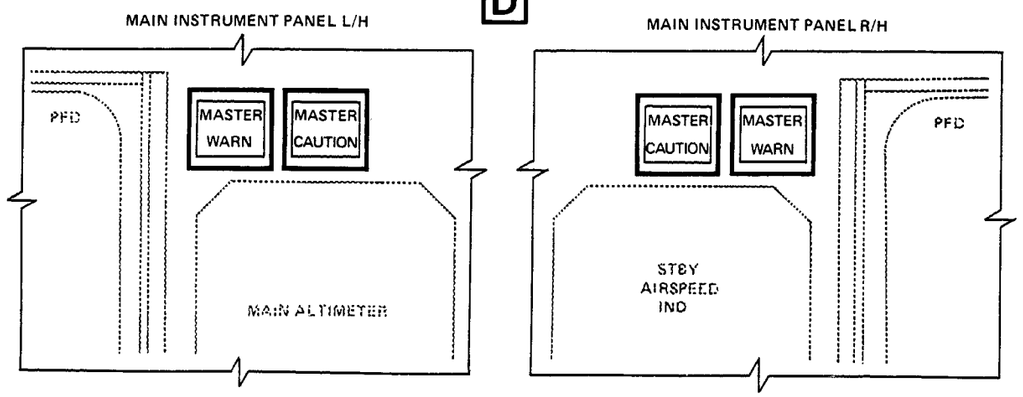


B



SYSTEM DISPLAY

D



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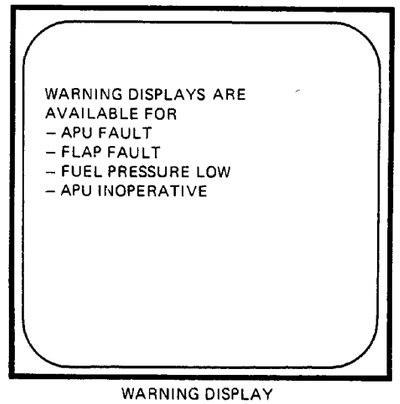

WARNING DISPLAY

BM6 49 00 00 0 ALNO 00

APU System and Warning Display
Figure 006

EFFECTIVITY: ALL

R

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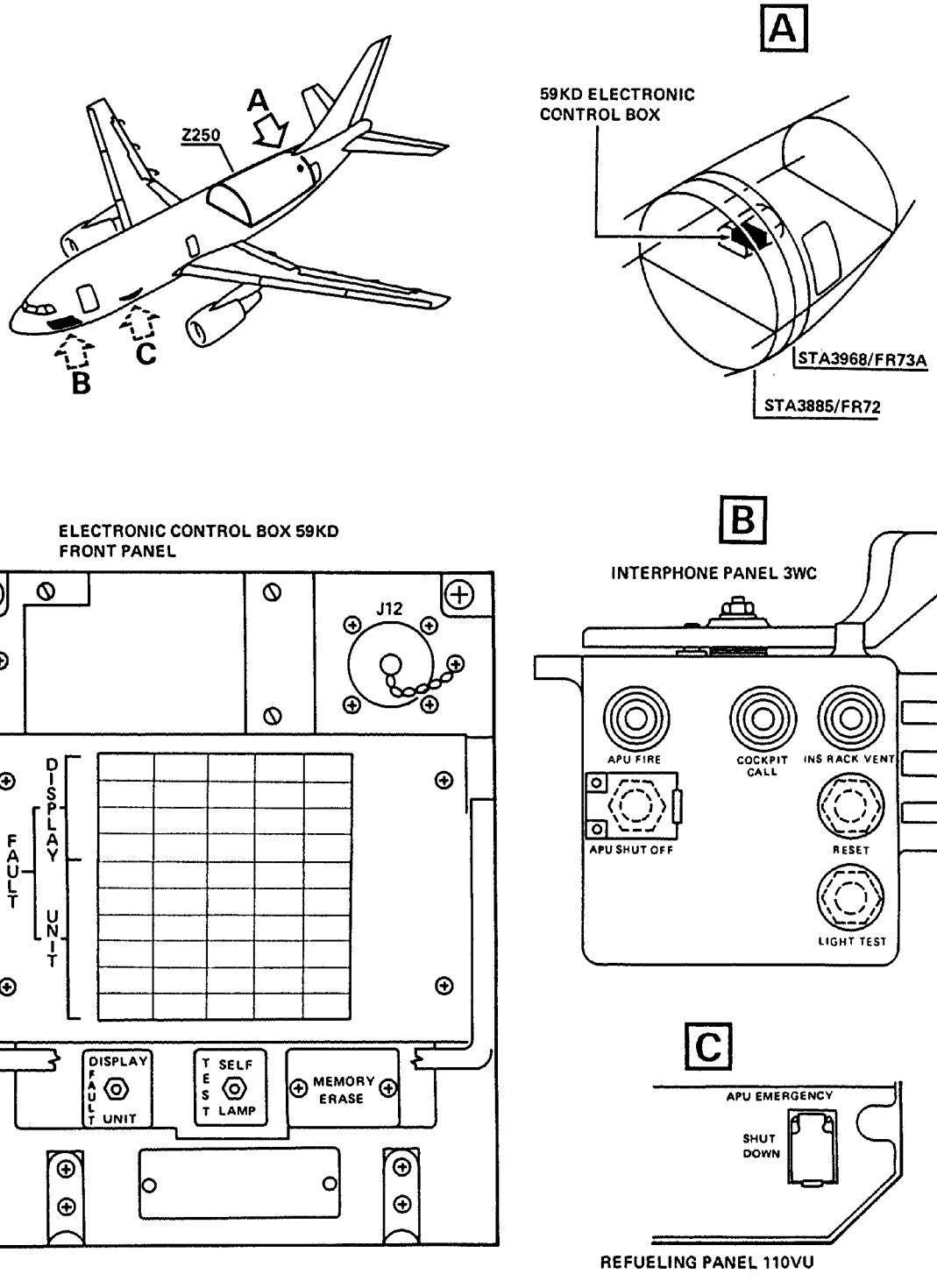
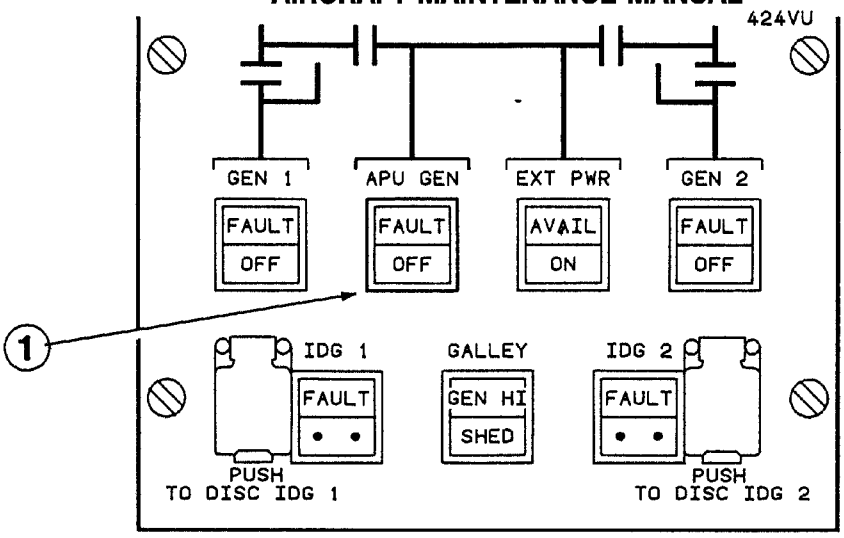


APU Controls
Figure 007



(1) APU GEN PUSHBUTTON SWITCH:

THE PUSHBUTTON SWITCH CONTROLS:

- THE ENERGIZATION OF THE APU-DRIVEN GENERATOR FIELD,THE APU LINE CONTACTOR AND THE TRANSFER CONTACTOR 1 OR/AND 2 CLOSURE.
- OR THE REARMING OF THE PROTECTION SYSTEM AFTER FAILURE.

THE GEN 1 (OR 2) HAVING PRIORITY OVER THE APU-DRIVEN GENERATOR, THE APU GEN PUSHBUTTON SWITCH IS ONLY EFFICIENT ON THE SIDE WHERE AN ENGINE-DRIVEN GENERATOR HAS FAILED.

- ON (P/B SWITCH PRESSED-IN)

  THE APU-DRIVEN GENERATOR FIELD IS ENERGIZED.

  THE APU GEN LINE CONTACTOR CLOSES IF THE APU GEN PARAMETERS ARE NORMAL.

  IN THE EVENT OF GEN 1 (OR 2) LOSS THE TRANSFER CONTACTOR 1 (OR 2) CLOSES AUTOMATICALLY.

- OFF/R (P/B SWITCH RELEASED-OUT)

  THE OFF/R LEGEND COMES ON WHITE. THE APU GEN FIELD IS DE-ENERGIZED AND THE APU GEN LINE CONTACTOR OPENS.

  THE PROTECTION SYSTEM IS REARMED EXCEPT WHEN THERE IS A DIFFERENTIAL FAULT WHERE THE PROTECTION SYSTEM HAS TO BE REARMED BY ACTION ON THE APU GENERATOR CONTROL UNIT (GCU) ITSELF.

- FAULT

  THE LEGEND COMES ON AMBER,IN THE EVENT OF:

  - A PROTECTION TRIP INITIATED BY THE GENERATOR CONTROL UNIT (GCU). THE APU GEN LINE CONTACTOR AUTOMATICALLY OPENS.
  - AN OPENING OF THE LINE CONTACTOR.

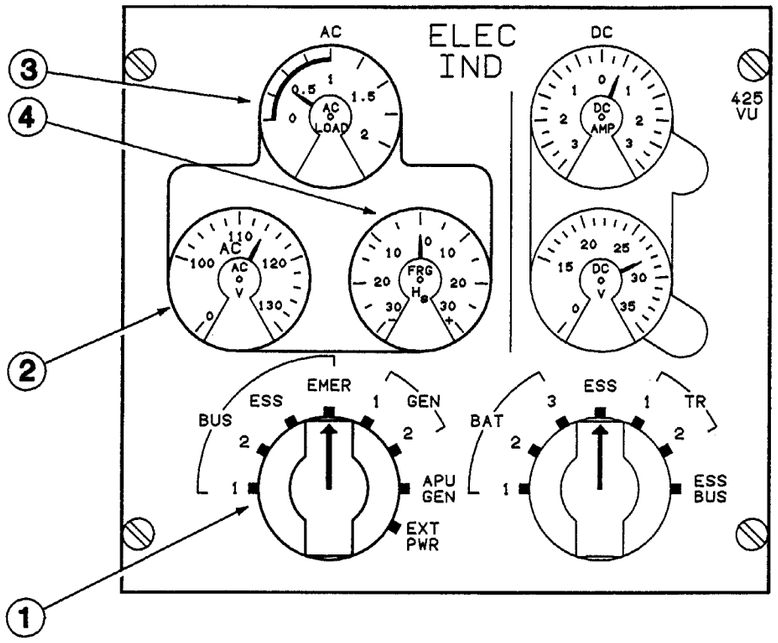
  ILLUMINATION OF THE FAULT LEGEND IS ACCOMPANIED BY ECAM ACTIVATION.

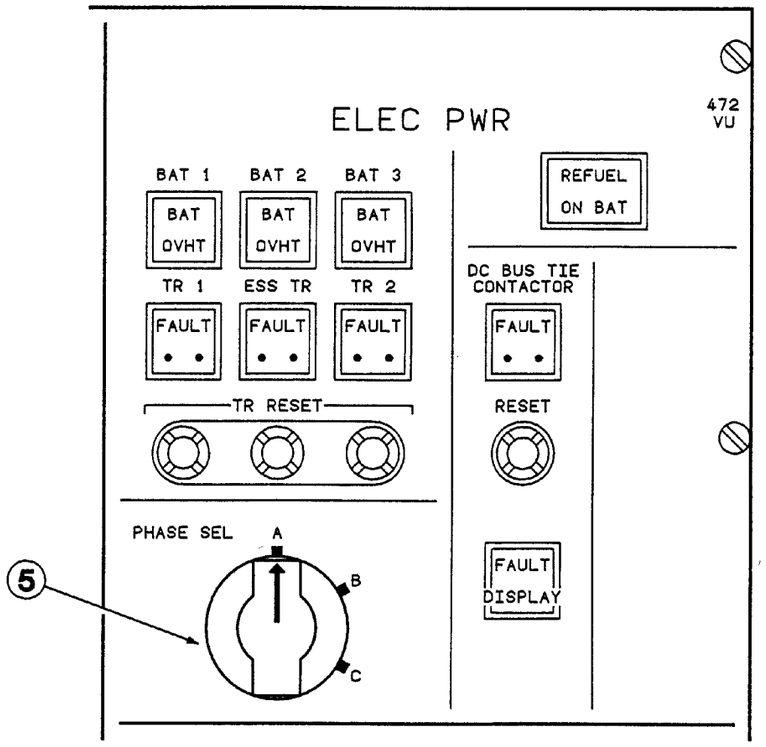
  THE FAULT WARNING IS INHIBITED IF:

  - THE APU GEN PUSHBUTTON SWITCH IS SELECTED OFF/R.
  - OR,THE APU DRIVE SPEED IS TOO LOW.

BM6 49 00 00 0 A0M0 00

ELEC PWR Panel 424VU
Figure 008





(1) AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR

IT ALLOWS TO SELECT PICK-UP POINTS OF THE ELECTRICAL NETWORK TO BE CONNECTED TO THE AC(V)-FRQ-LOAD INDICATORS FOR THE PHASE SELECTED ON THE PHASE SEL (A-B-C) ROTARY SELECTOR LOCATED ON THE MAINTENANCE PANEL.

- APU GEN POSITION.

  THE PHASE SEL (A-B-C) ROTARY SELECTOR IS OPERATIVE. AC VOLTAGE AND FREQUENCY INDICATIONS OF THE PHASE SELECTED BY THE PHASE SEL (A-B-C) ROTARY SELECTOR,ARE DISPLAYED ON THE CORRESPONDING INDICATORS.

  IN ADDITION A LOAD INDICATION IS DISPLAYED ON A LOAD INDICATOR.

(2) AC(V) INDICATOR

IT INDICATES THE AC VOLTAGE AT THE PICK-UP POINT SELECTED BY THE AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR AND THE PHASE SEL (A-B-C) ROTARY SELECTOR WHEN THIS LAST ONE IS OPERATIVE.

THE NORMAL READING IS WITHIN THE WHITE ARC.

(3) AC LOAD INDICATOR

IT INDICATES THE TOTAL CURRENT OUTPUT FROM APU GEN BY SELECTING THE CORRESPONDING PICKUP POINT WITH THE AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR.

THE INDICATOR IS GRADUATED IN PERCENTAGE (1 MEANS 100% OF RATED OUTPUT).

THE NORMAL READING IS WITHIN THE WHITE ARC.

(4) FRQ INDICATOR

IT INDICATES THE FREQUENCY AT PICK-UP POINT SELECTED BY THE AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR AND THE PHASE SEL (A-B-C) ROTARY SELECTOR WHEN THIS LAST ONE IS OPERATIVE.

THE NORMAL READING IS WITHIN THE WHITE ARC.

(5) AC PHASE SEL (A-B-C) ROTARY SELECTOR

IT ALLOWS TO SELECT THE AC VOLTAGE PHASE TO BE INDICATED ON THE AC(V) AND FRQ INDICATORS WHEN THE AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR IS SELECTED GEN 1,GEN 2,APU GEN OR EXT PWR.

THE PHASE SEL SELECTOR IS INOPERATIVE IN ALL OTHER POSITIONS OF THE AC(V)-FRQ-LOAD DISPLAY ROTARY SELECTOR.

BM6 49 00 00 0 AQN0 00

ELEC IND Panel 425VU
Figure 009

R EFFECTIVITY: ALL

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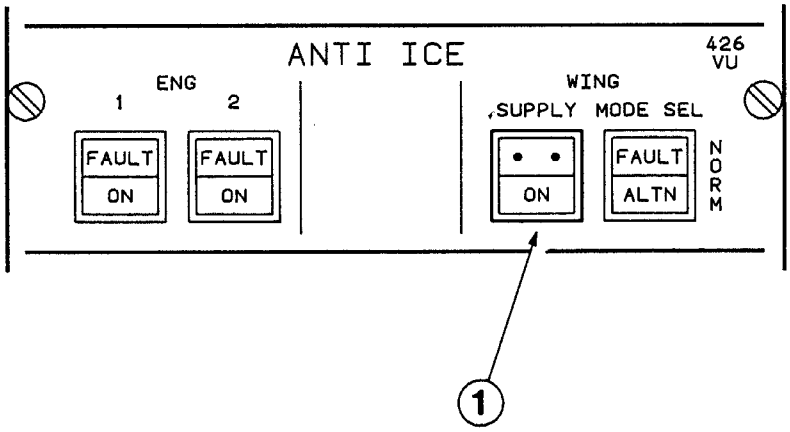


(1) ANTI ICE WING SUPPLY PUSHBUTTON SWITCH

CONTROLS WING ANTI-ICE SYSTEM SIMULTANEOUSLY ON LEFT AND RIGHT SIDE.

- ON (P/B SWITCH PRESSED-IN)

  THE ON LEGEND COMES ON BLUE.

  - WITH APU BLEED AIR SUPPLY:

    APU SPEED INCREASES TO 102.5% RPM (DE-ICE MODE).
    ALL FOUR WING ANTI-ICE VALVES OPEN.

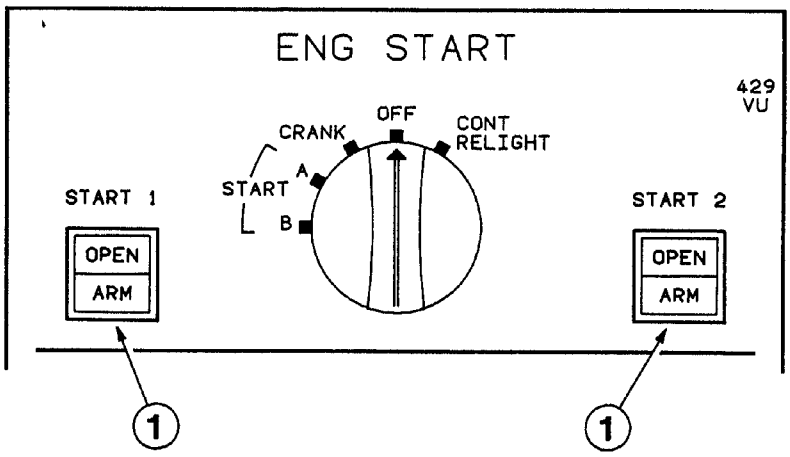
  NOTE: THE INDICATION WING ANTI ICE ON IS DISPLAYED ON ECAM MEMO PAGE.

- OFF (P/B SWITCH RELEASED-OUT)

  WING ANTI-ICE VALVES CLOSE,THE ON LEGEND GOES OFF.

BM6 49 00 00 0 AQS0 00

ANTI ICE Panel 426VU
Figure 010

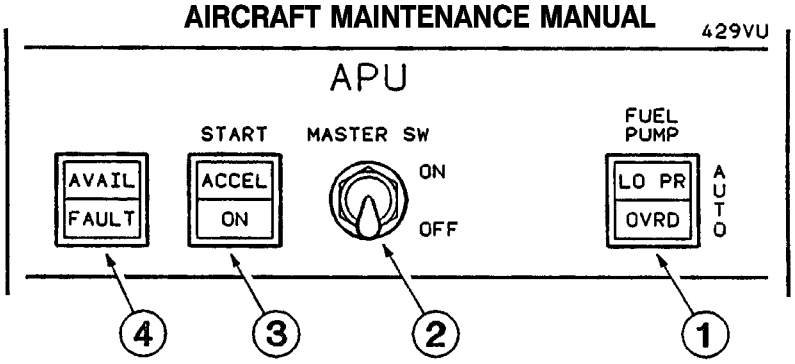


(1) START 1/START 2 PB SWITCHES

- RELEASED-OUT,NO LIGHT: THE SWITCH CANNOT BE LATCHED.
- ARM LEGEND (SWITCH RELEASED-OUT) COMES ON WHITE BEFORE STARTING SEQUENCE WHEN: THE ENG START SELECTOR IS NOT IN OFF POSITION. THE SWITCH CAN BE LATCHED. IF THE ENG START SELECTOR IS ON START A,START B OR CRANK POSITION, THE PACK VALVES ARE CONTROLLED CLOSED.
- OPEN LEGEND (SWITCH PRESSED-IN) COMES ON BLUE: THE APU SPEED INCREASES TO 101.4% RPM (MES MODE). THE STARTING SEQUENCE OF THE RELEVANT ENGINE IS INITIATED BY OPENING ITS START VALVE. THE LEGEND GOES OFF AND THE SWITCH POPS OUT WHEN THE START VALVE IS CONTROLLED CLOSED,I.E.,WHEN N2 IS ABOVE 45%.

BM6 49 00 00 0 ASM0 00

ENG START Panel 429VU
Figure 011



(1)

FUEL PUMP PUSHBUTTON-SWITCH

SELECTS THE OPERATION MODE OF THE LP FUEL PUMP.

- AUTO: (P/B SWITCH PRESSED IN). THE LP FUEL PUMP OPERATES AUTOMATICALLY WHEN THE FUEL PRESSURE UPSTREAM OF THE PUMP IS BELOW 22 PSI PROVIDED THAT MASTER SW IS SELECTED ON AND AC EMER BUS IS SUPPLIED.

- LO PR: THE LEGEND COMES ON AMBER ACCOMPANIED BY ECAM WHEN THE APU MASTER SW IS SELECTED ON AND THE APU FUEL PRESSURE IS BELOW 6 PSI.

- OVRD: (P/B SWITCH RELEASED OUT). THE LP FUEL PUMP OPERATES CONTINUOUSLY PROVIDED THAT AC EMER BUS IS SUPPLIED AND MASTER SW IS SELECTED ON. OVRD GREEN LEGEND COMES ON.

(2)

MASTER SW

CONTROLS POWER SUPPLY FOR APU STARTING,CONTROL AND PROTECTION.

-ON: CONTROL AND PROTECTION SYSTEMS ARE ENERGIZED. THE FUEL ISOLATION VALVE OPENS,THE LP FUEL PUMP IS ARMED OR ACTIVATED.

THE STARTING SYSTEM IS ARMED.
THE AIR INTAKE FLAP IS OPEN.

NOTE: WHEN MASTER SW IS SELECTED ON AND RPM >95% THE INDICATION APU RUNNING IS DISPLAYED ON THE MEMO PAGE OF THE WARNING DISPLAY.

-OFF: APU SHUTS DOWN. (IF THE APU BLEED LOAD VALVE WAS OPEN,WHEN SELECTING OFF,THE SHUTDOWN IS DELAYED FOR MIN. 60 SECONDS TO ALLOW FOR A COOLING PERIOD).
THE FUEL ISOLATION VALVE CLOSES. LP FUEL PUMP,STARTING CONTROL AND PROTECTION SYSTEMS ARE DE-ENERGIZED.

(3)

START PUSHBUTTON-SWITCH

INITIATES THE STARTING SEQUENCE IF THE MASTER SW IS SELECTED ON.

- ON (P/B SWITCH PRESSED IN.): THE STARTING SEQUENCE IS INITIATED PROVIDED THAT THE AIR INTAKE FLAP IS OPEN. THE ON LEGEND COMES ON WHITE.
THE P/B SWITCH REMAINS LATCHED. IT IS AUTOMATICALLY RELEASED OUT AT 42% TO 50% RPM,DEPENDENT ON ACCELERATION RATE.

- OFF (P/B SWITCH RELEASED OUT): STARTING SEQUENCE IS NOT INITIATED.

- ACCEL: THE LEGEND COMES ON BLUE AS SOON AS THE START MOTOR IS ENERGIZED. IT GOES OFF WHEN 95% RPM.

(4)

AVAIL/FAULT LIGHTS

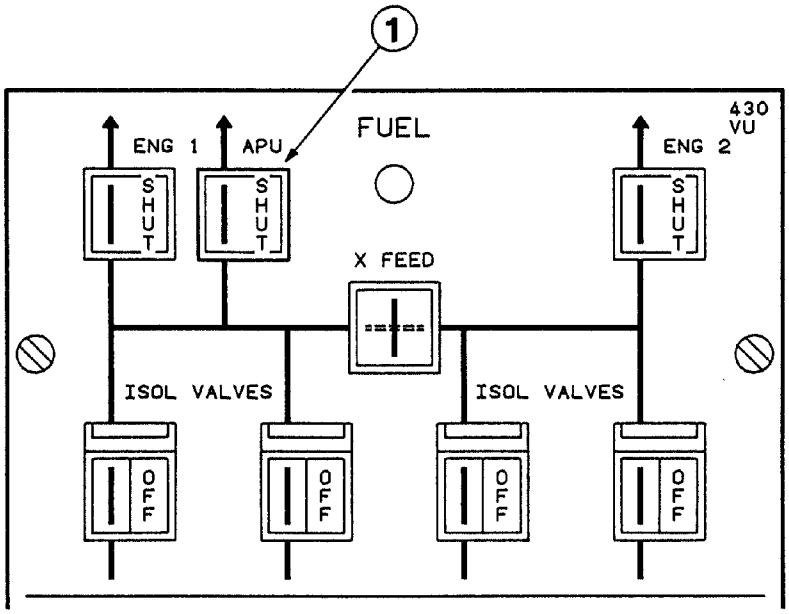
-AVAIL: THE LEGEND COMES ON BLUE WHEN THE RPM REACHES 95% (THE APU IS READY TO LOAD).

-FAULT: THE LEGEND COMES ON AMBER ACCOMPANIED BY ECAM WHEN:

- RPM IS BELOW 7% AND THE AIR INTAKE FLAP IS NOT OPEN WITHIN 30 SECONDS.
- AN APU AUTOMATIC SHUTDOWN OCCURS,EXCEPT WHEN IT IS INITIATED BY THE MASTER SW.

BM 6 49 00 00 0 AYNO 00

APU Panel 429VU
Figure 012



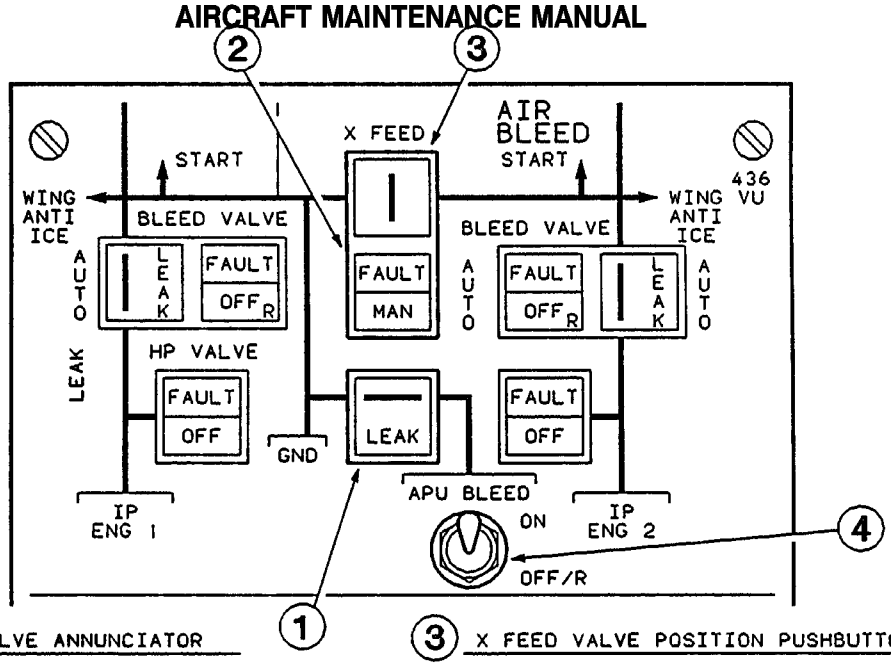
(1) APU LP VALVES ANNUNCIATORS

THE POSITION OF THE LP VALVES IN THE FUEL FEED LINES TO THE APU IS DISPLAYED. THE VALVE CLOSES ONLY WHEN THE APU FIRE HANDLE IS PULLED.

- IN LINE
  FLOWBAR COMES ON GREEN, SHUT LIGHT IS OFF.
  THE VALVE IS OPEN.
- SHUT
  THE LIGHT COMES ON AMBER, THE FLOWBAR IS OFF.
  THE VALVE IS CLOSED.

BM6 49 00 00 0 ASS0 00

FUEL Panel 430VU
Figure 013



(1) APU BLEED VALVE ANNUNCIATOR

-FLOWBAR COMES ON TO INDICATE THE POSITION OF THE APU BLEED VALVE

IN LINE THE VALE IS OPEN

OFF THE VALVE IS CLOSED

-LEAK COMES ON AMBER ACCOMPANIED BY ECAM ACTIVATION, WHEN OVERHEAT IS DETECTED BY THE LOOPS IN APU PNEUMATIC DUCT

(2) X FEED MODE PUSHBUTTON SWITCH

THE P/B SWITCH SELECTS THE OPERATING MODE, AUTOMATIC OR MANUAL, OF THE CROSSFEED VALVE

-AUTO (P/B SWITCH PRESSED-IN) VALVE OPERATES AUTOMATICALLY ACTUATED BY ELECTRIC MOTOR 1 THE CROSSFEED VALVE IS OPEN WHEN AIR IS BLED FROM APU
THE CROSSFEED VALVE IS CLOSED WHEN

-AIR IS BLED FROM ENGINES 1 AND 2

-ENG 1 (2) FIRE HANDLE IS PULLED

-APU FIRE HANDLE IS PULLED

-OVERHEAT IS DETECTED IN APU OR LH (RH) WING OR LH (RH) PYLON DUCTS

-MAN (P/B SWITCH RELEASED-OUT) THE MAN LIGHT COMES ON WHITE THE CROSSFEED VALVE IS OPERATED MANUALLY BY PRESSING THE X FEED FLOWBAR PUSHBUTTON SWITCH WHICH ACTIVATES ELECTRIC MOTOR 2

-FAULT THE LIGHT COMES ON ACCOMPANIED BY ECAM ACTIVATION WHEN CROSSFEED VALVE POSITION DISAGREES WITH AUTOMATIC SELECTED POSITION

NOTE THE FAULT LIGHT COMES ON WITHOUT ECAM ACTIVATION DURING VALVE TRANSIT IN AUTOMATIC MODE

B M 6 49 00 00 0 ASU0 01

(3) X FEED VALVE POSITION PUSHBUTTON SWITCH

IN AUTO MODE THE SELECTION OF THE FEED VALVE POSITION P/B SWITCH IS WITHOUT ANY EFFECT ON VALVE POSITIONING AND RELATED INDICATION

IN MAN MODE

-PRESSED-IN THE X FEED VALVE IS MANUALLY OPENED

-RELEASED-OUT THE X FEED VALVE IS MANUALLY CLOSED

THE INTEGRATED GREEN FLOWBAR DISPLAYS VALVE POSITION

-IN LINE THE VALVE IS OPEN (AUTOMATICALLY OR MANUALLY)

-CROSS LINE THE VALVE IS CLOSED (AUTOMATICALLY OR MANUALLY)

(4) APU BLEED SWITCH

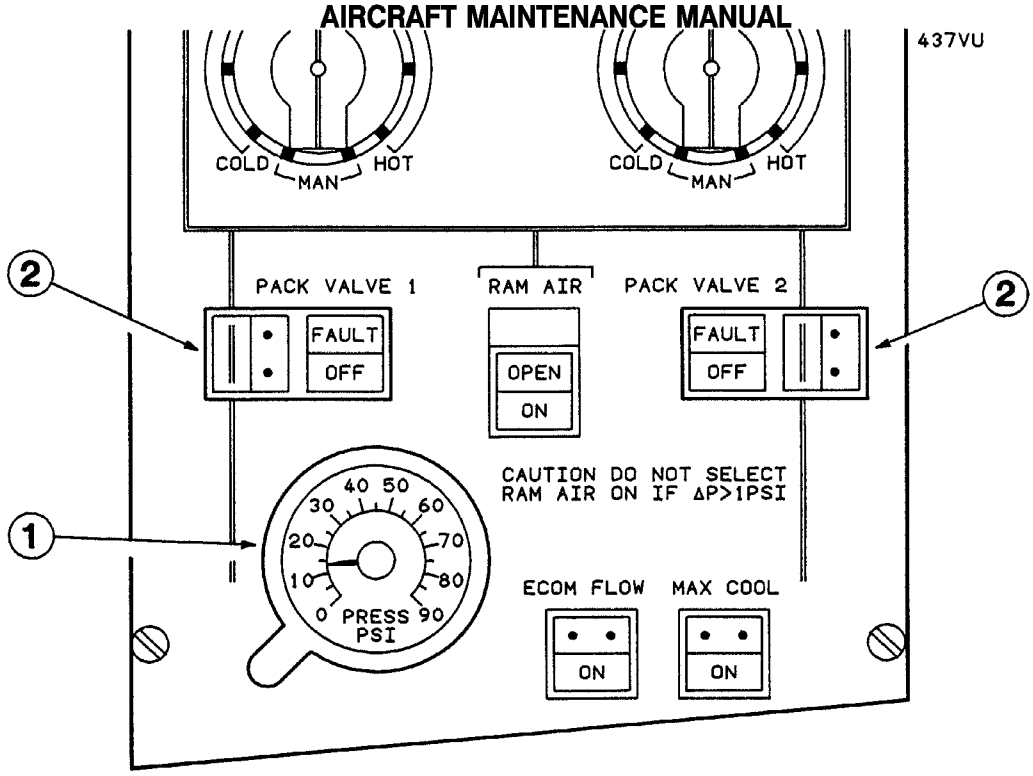
THE SWITCH CONTROLS THE OPERATION OF THE APU BLEED VALVE

-ON ENGINE 1 AND ENGINE 2 BLEED VALVES CLOSE CROSSFEED VALVE OPENS IF X FEED MODE P/B SWITCH SELECTED AUTO

APU BLEED VALVE OPENS IF APU MASTER SWITCH IS PLACED IN ON POSITION AND APU RPM HAS INCREASED UP TO 95% THE VALVE WILL AUTOMATICALLY CLOSE IN THE EVENT OF APU SHUTDOWN OR APU LEAK WARNING

-OFF/R APU BLEED VALVE CLOSES AND THE AUTOMATIC MONITORING SYSTEM IS RESET

AIR BLEED Panel 436VU
Figure 014



(1) PRESS INDICATOR:

THE INDICATOR SHOWS THE PNEUMATIC PRESSURE AT THE ENG 1 BLEED VALVE OUTLET.
THE NORMAL PRESSURE RANGES BETWEEN 30 AND 50 PSI.

(2) PACK VALVE 1 (2) PUSHBUTTON SWITCHES

SELECT AUTOMATIC OPERATION OR MANUAL CLOSURE OF THE RESPECTIVE PACK VALVE.

- AUTO (P/B SWITCH PRESSED-IN): VALVE IS PNEUMATICALLY CONTROLLED.

  THE APU SPEED IS CONTROLLED TO 100% RPM (ECS MODE).

  THE VALVE IS PNEUMATICALLY CLOSED,WHEN OVERHEAT OCCURS AT COMPRESSOR OUTLET OR TURBINE INLET EXCEEDING THE LIMIT OF THE FUSIBLE PLUGS. THE VALVE IS CLOSED BY SPRING FORCE,IF IT IS NOT SUPPLIED WITH PNEUMATIC PRESSURE.

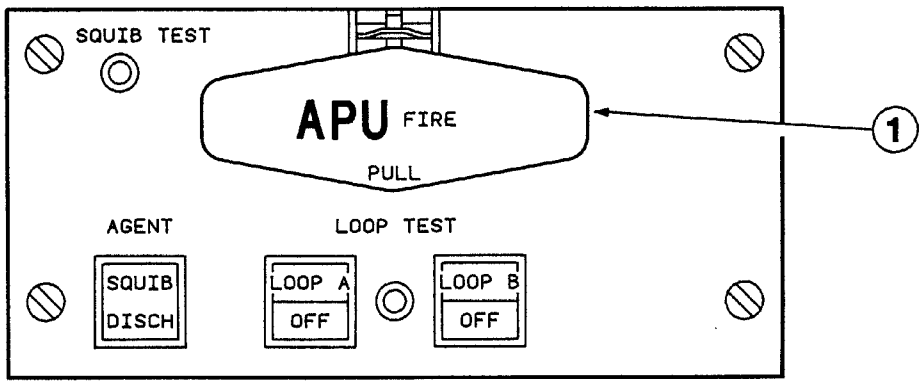
- OFF (P/B SWITCH RELEASED-OUT): THE VALVE IS ELECTRICALLY CLOSED. THE OFF LIGHT COMES ON WHITE.

- FAULT: ILLUMINATES AMBER,WHEN THE POSITION OF THE PACK VALVE DISAGREES WITH THE SELECTED POSITION.
  IF THE FAULT LIGHT REMAINS ON FOR MORE THAN 60 SEC.,THE ECAM SYSTEM IS ACTIVATED.

  MOMENTARY ILLUMINATION OCCURS,WHEN VALVE IS IN TRANSIT.

BM6 49 00 00 0 ASW0 00

COMPT TEMP Panel 437VU
Figure 015



(1) APU FIRE HANDLE

THE APU FIRE HANDLE HAS TWO POSITIONS. AN APU FIRE WARNING LIGHT IS INTEGRATED INTO THE HANDLE.

- IN

  NORMAL POSITION,MECHANICALLY LOCKED.

- PULLED

  PULLING THE HANDLE ELECTRICALLY CAUSES:

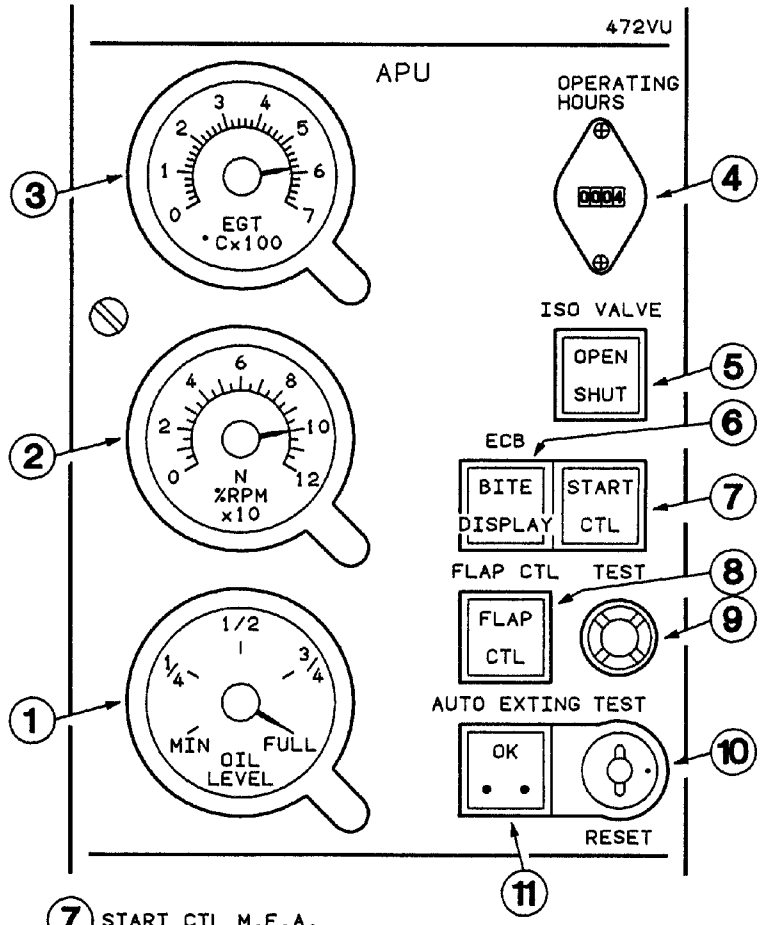
  - APU EMERGENCY SHUTDOWN (REF. 49-62-00)
  - APU ISOLATION VALVE CLOSURE
  - FUEL APU LP FIRE SHUTOFF VALVE CLOSURE
  - CONTINUOUS REPETETIVE CHIME (CRC) SILENCING AND LOOP LIGHT GOES OFF,SQUIB LIGHT COMES ON.

- APU FIRE

  THE LIGHT COMES ON RED INDEPENDENTLY OF HANDLE POSITION AS LONG AS THE FIRE WARNING IS ACTIVATED. APU FIRE GOES OFF WHEN THE TEMPERATURE DETECTED BY LOOPS DROPS BELOW WARNING THRESHOLD. ILLUMINATION OF THE APU FIRE LIGHT IS ACCOMPANIED BY ECAM ACTIVATION.

BM6 49 00 00 0 ASY0 00

APU FIRE Control Module 20WG
Figure 016



1 OIL LEVEL INDICATION

OIL LEVEL IS INDICATED. BELOW 60% RPM THE OIL LEVEL INDICATION IS STATIC. ABOVE THE INDICATION BECOMES DYNAMIC.

2 RPM INDICATION

THE RPM IS INDICATED IN PERCENT OF NOMINAL SPEED. ACTIVE WHEN MASTER SW IS SELECTED ON, DE-ACTIVATED 60 SEC. AFTER THE APU SPEED IS BELOW 7% RPM.

3 EGT INDICATION

EXHAUST GAS TEMPERATURE AT TURBINE EXIT IS INDICATED IN °C. ACTIVE WHEN MASTER SW IS SELECTED ON, DE-ACTIVATED 60 SEC. AFTER THE APU SPEED IS BELOW 7% RPM DURING START, THE SIGNAL IS ATTENUATED.

4 OPERATING HOURS

THE INDICATOR TOTALIZES THE APU OPERATING TIME WHEN ABOVE 95% RPM.

5 ISOL VALVE INDICATION

POSITION OF THE APU FUEL ISOLATION VALVE IS INDICATED BY OPEN OR SHUT WHITE LEGENDS.

6 ECB - BITE DISPLAY M.F.A.

STORES ECB FAULTS LEADING TO AN APU AUTOMATIC SHUTDOWN.

7 START CTL M.F.A.

STORES START CONTACTORS FAILURES.

8 FLAP CTL M.F.A.

STORES AIR INTAKE FLAP MALFUNCTIONS.

9 FLAP CTL TEST PUSHBUTTON

WHEN PRESSED IN FOR 30 SEC. CHECKS AIR INTAKE FLAP SEQUENCE.

10 AUTO EXTING TEST RESET SWITCH

TEST IS TO BE PERFORMED ON GROUND ONLY.

- TEST

  SWITCH MUST BE HELD DURING TEST. MASTER SW MUST BE SELECTED ON. APU FIRE WARNING, AUTO EXTINGUISHING AND SHUTDOWN CIRCUITS ARE TESTED. SEQUENCE DURATION IS 10 SECONDS. THE OK WHITE LIGHT COMES ON TO INDICATE A SUCCESSFUL TEST.

  NOTE: IF IN OPERATION, THE APU SHUTS DOWN.

- RESET

  TEST CIRCUIT IS RESET.

- NEUTRAL

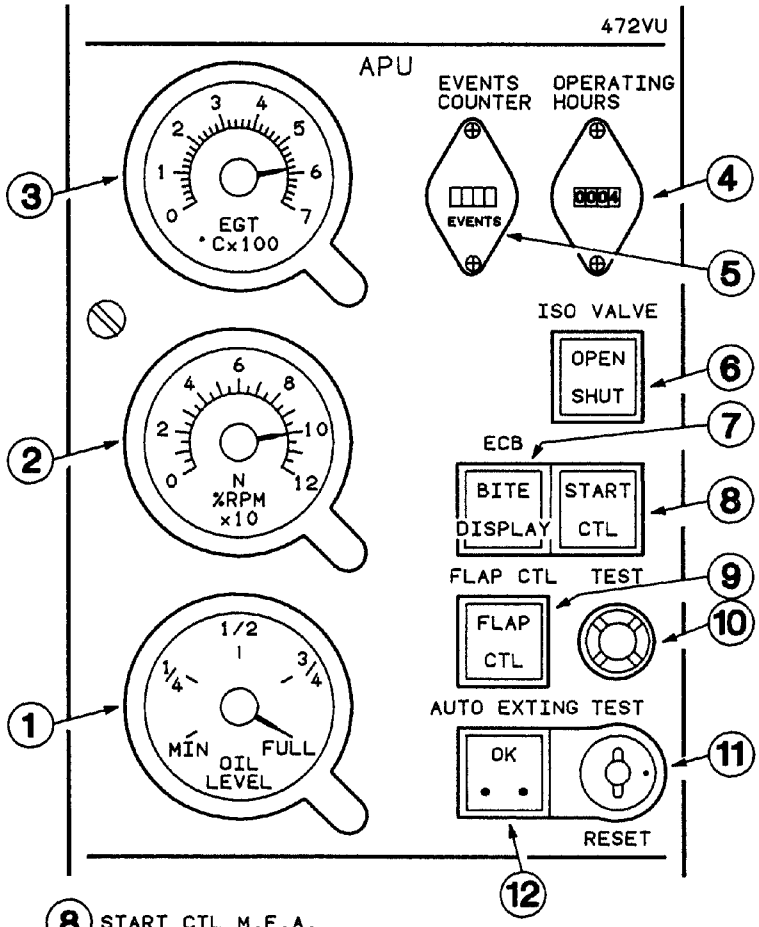
  TEST CIRCUIT NOT ENERGIZED.

11 AUTO EXTING - OK LIGHT

COMES ON WHITE WHEN AUTO EXTINGUISHING SEQUENCE IS COMPLETED AND TEST RESULT IS POSITIVE.

B M 6 49 00 00 0 AUM0 00

APU Maintenance Panel 472VU
Figure 017



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OIL LEVEL IS INDICATED. BELOW 60% RPM THE OIL LEVEL INDICATION IS STATIC. ABOVE THE INDICATION BECOMES DYNAMIC.

2 RPM INDICATION

THE RPM IS INDICATED IN PERCENT OF NOMINAL SPEED. ACTIVE WHEN MASTER SW IS SELECTED ON, DE-ACTIVATED 60 SEC. AFTER THE APU SPEED IS BELOW 7% RPM.

3 EGT INDICATION

EXHAUST GAS TEMPERATURE AT TURBINE EXIT IS INDICATED IN °C. ACTIVE WHEN MASTER SW IS SELECTED ON, DE-ACTIVATED 60 SEC. AFTER THE APU SPEED IS BELOW 7% RPM DURING START, THE SIGNAL IS ATTENUATED.

4 OPERATING HOURS

THE INDICATOR TOTALIZES THE APU OPERATING TIME WHEN ABOVE 95% RPM.

5 EVENTS COUNTER

THE INDICATOR RECORDS THE NUMBER OF APU STARTS, WHEN APU SPEED EXCEEDS 95%.

6 ISOL VALVE INDICATION

POSITION OF THE APU FUEL ISOLATION VALVE IS INDICATED BY OPEN OR SHUT WHITE LEGENDS.

7 ECB - BITE DISPLAY M.F.A.

STORES ECB FAULTS LEADING TO AN APU AUTOMATIC SHUTDOWN.

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WHEN PRESSED IN FOR 30 SEC. CHECKS AIR INTAKE FLAP SEQUENCE.

11 AUTO EXTING TEST RESET SWITCH

TEST IS TO BE PERFORMED ON GROUND ONLY.

- TEST

  SWITCH MUST BE HELD DURING TEST. MASTER SW MUST BE SELECTED ON. APU FIRE WARNING, AUTO EXTINGUISHING AND SHUTDOWN CIRCUITS ARE TESTED. SEQUENCE DURATION IS 10 SECONDS. THE OK WHITE LIGHT COMES ON TO INDICATE A SUCCESSFUL TEST.

  NOTE: IF IN OPERATION, THE APU SHUTS DOWN.

- RESET

  TEST CIRCUIT IS RESET.

- NEUTRAL

  TEST CIRCUIT NOT ENERGIZED.

12 AUTO EXTING - OK LIGHT

COMES ON WHITE WHEN AUTO EXTINGUISHING SEQUENCE IS COMPLETED AND TEST RESULT IS POSITIVE.

B M 6 49 00 00 0 AUNO 00

APU Maintenance Panel 472VU
Figure 018

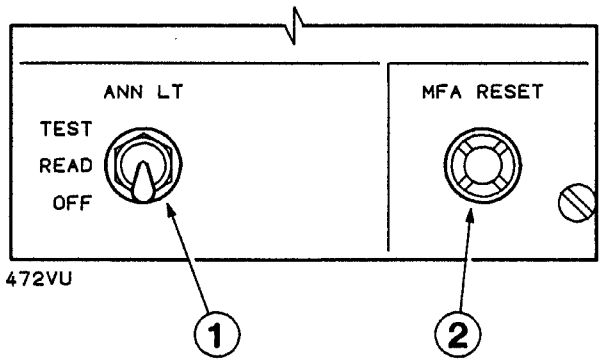
**ON A/C ALL

(Ref. Fig. 019)
- Main instrument panel, contains the ECAM system display for the system function and warnings (Ref. 49-70-00).

(Ref. Fig. 020)

(2)APU External Controls
(Ref. Fig. 021)
The APU external control is provided for exterior fire warning and emergency shutdown (Ref. 26-22-00).

(3)APU Fault Indication
(Ref. Fig. 022)



(1) ANN LT SELECTOR

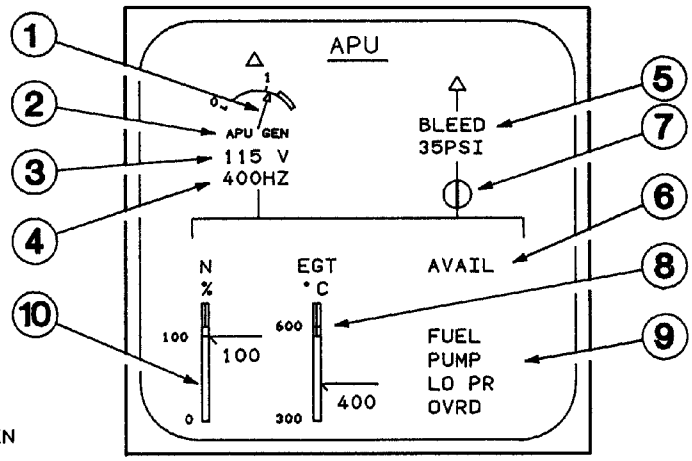
- TEST: ALL ANNUNCIATOR LIGHTS COME ON, ON MAINTENANCE PANEL.
- READ: WHEN ACTIVATED, ANNUNCIATOR LIGHTS COME ON.
- OFF : ALL ANNUNCIATOR LIGHTS ARE OFF.

(2) MFA RESET PUSHBUTTON SWITCH

WHEN THE MFA RESET P/B SW ARE PRESSED, ALL MFA'S FOR EACH SYSTEM INCLUDED IN THE CORRESPONDING SECTION OF THE MAINTENANCE PANEL GO OFF.

BM6 49 00 00 0 AUQ0 00

APU Maintenance Panel 472VU
Figure 019



(1) APU GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110%
Δ(W) REPLACES LOAD INDICATION WHEN APU MASTER SW IS IN OFF POSITION

(2) APU GEN (W)
(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND APU MASTER SW IS IN ON POSITION

(3) APU GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

(4) APU GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION OR APU GEN P/B SWITCH IS SELECTED OFF/R

(5) APU BLEED PRESSURE (G)
(A) WHEN PRESSURE ≥ 57PSI
NOT DISPLAYED WHEN BLEED VALVE CLOSED

(6) AVAIL (NOT DISPLAYED)
AVAIL(G) WHEN N ≥ 95% AND APU MASTER SW IS IN ON POSITION

(7) APU BLEED VALVE
⊕ (G) : VALVE OPEN
⊖ (G) : VALVE CLOSED

(8) APU EXHAUST GAS TEMERATURE (G)
(A) WHEN EGT ≥ 585°C FLASHES WHEN EGT ≥ 540°C

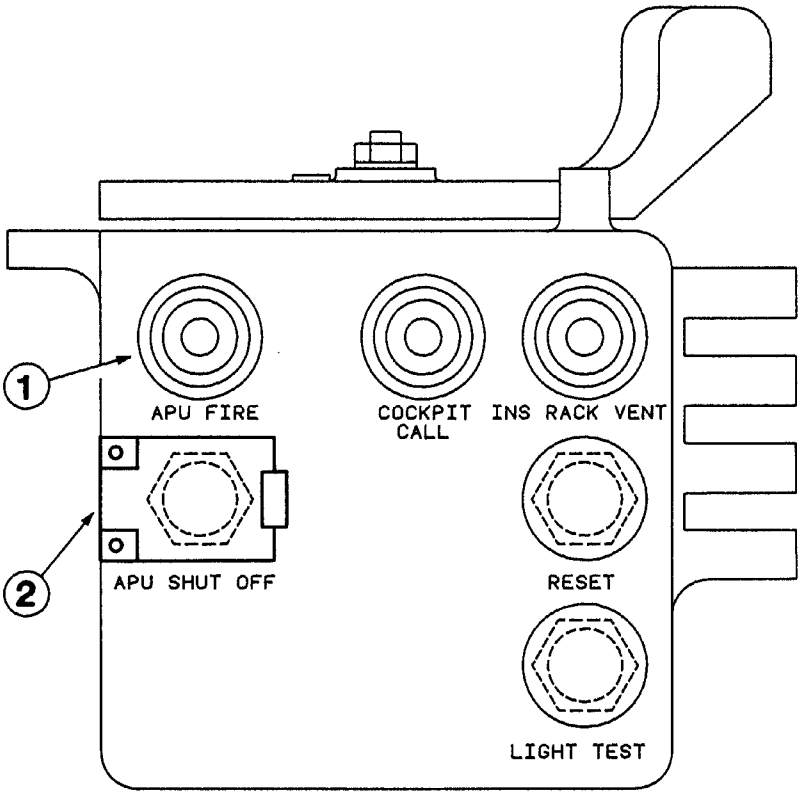
(9) FUEL PUMP (W) WHEN LO PR OR OVRD
LO PR (A) WHEN FUEL LOW PRESSURE DETECTED
OVRD (G) WHEN FUEL PUMP SW IS SELECTED OVRD
NOT DISPLAYED IN NORMAL OPERATION

NOTE: (G) GREEN
(A) AMBER
(W) WHITE

(10) APU RPM (G)
(A) WHEN N ≥ 107%

BM6 49 00 00 0 AWN0 00

APU ECAM System Page
Figure 020



ON GROUND ONLY, AN ADDITIONAL EXTERNAL WARNING IS PROVIDED IN THE EVENT OF AN APU FIRE.

(1) APU FIRE LIGHT

THE APU FIRE LIGHT COMES ON RED, ACCOMPANIED BY AN EXTERNAL HORN WARNING WHEN AN APU FIRE IS DETECTED.

THE APU FIRE EXTINGUISHER WILL AUTOMATICALLY DISCHARGE 10 SECONDS AFTER THE FIRE WARNING APPEARANCE.

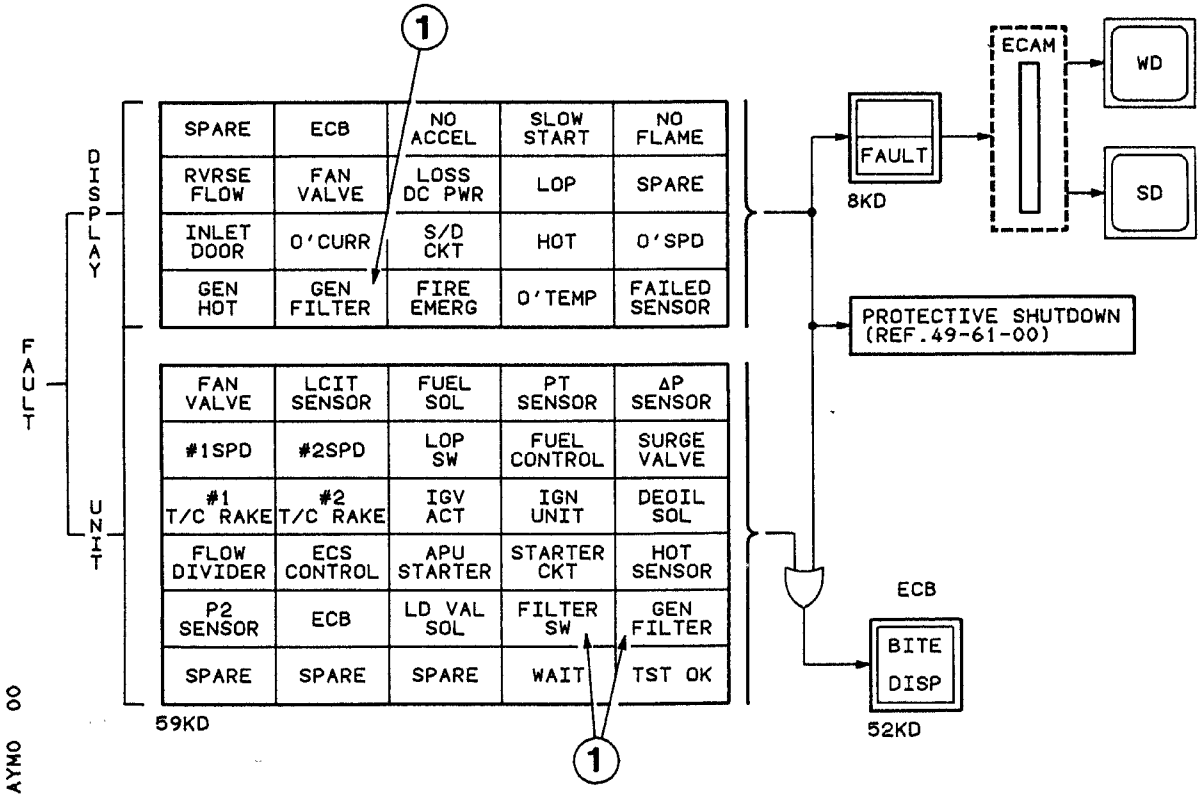
THE LIGHT WILL GO OFF AFTER EXTINCTION OF THE FIRE.

(2) APU SHUT OFF PUSHBUTTON

THE PUSHBUTTON IS GUARDED BY A FLAP. WHEN PRESSED, IN THE EVENT OF AN APU FIRE THE AUTOMATIC SHUTDOWN IS CONFIRMED AND THE EXTERNAL HORN WARNING IS SILENCED.

BM6 49 00 00 0 AXM0 00

APU External Control
Figure 021



BM6 49 00 00 0 AYM0 00

APU Fault Indication
Figure 022

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU.
DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS, UPON WHICH WORK IS IN PROGRESS, ARE ISOLATED.

WARNING : IGNITION SYSTEM IS ENERGIZED DURING ECB SELF TEST (BITE TEST).

WARNING : DO NOT TRY TO START THE APU AGAIN DURING A REFUEL/DEFUEL PROCEDURE AFTER AN AUTOMATIC SHUTDOWN OR FAILED APU START.
IF YOU DO, THERE IS A RISK OF INJURY AND/OR DAMAGE.

WARNING : WHILE THE APU OPERATES, DO NOT GO INTO THESE AREAS:
- THE AREA BEHIND THE APU EXHAUST DUCT: 25m (82ft.) REARWARD OF THE DUCT, MORE THAN 3m (10ft.) ABOVE THE GROUND, AND THE WIDTH OF THE HORIZONTAL STABILIZER
- THE AREA AROUND THE APU AIR-INTAKE: 2m (7ft.) AROUND THE INTAKE
- THE AREA OF THE OIL-COOLER OUTLET.

THERE IS A RISK OF INJURY IF YOU GO INTO THESE AREAS.

R WARNING : BEFORE YOU DO A SELF-TEST OF THE ECB, MAKE SURE THAT THERE IS NO
R OTHER MAINTENANCE TASK ON THE APU AT THE SAME TIME.
R DURING THE SELF-TEST, THE ECB WILL CAUSE THE IGNITION PLUG TO FIRE
R A NUMBER OF TIMES.

WARNING : MAKE CERTAIN THAT APU AIR INTAKE FLAP AREA IS CLEAR BEFORE OPERATING THE APU MASTER SWITCH.

CAUTION : AVOID OPERATION OF APU DURING DE-ICING OPERATIONS. INGESTION OF DE-ICING FLUID CAN CAUSE INTERNAL CONTAMINATION.

NOTE : When the aircraft is parked in a temperature of -15 deg C.(+5 deg F.) or lower, it is recommended to use an External Ground Power Unit to start the APU. Make certain that the APU air intake and Air Conditioning Packs deflect doors and modulating flaps are free from snow and ice.

NOTE : An aircraft bleed ducting pressure of maximum 6 psi may be observed after APU BLEED is selected to OFF (APU Bleed Load Valve is selected to closed). This represents the normal condition, with no detrimental effect on aircraft operation.

This Adjustment/Test contains information for carrying out the following procedures:

- ECB (59KD) Test (Ref. Step 1.)
  . Read 'ECB/BITE DISPLAY' MFA 52KD (Ref. Step 1. Para. (2))
  . ECB Self Test (Ref. Step 1. Para. (3))
  . Read ECB 'FAULT/DISPLAY/UNIT' (Ref. Step 1. Para. (4))

- APU Generator, Simulated GEN HOT Signal (Ref. Step 2.)

- Dry Motoring, Purging, Wet Motoring (Ref. Step 3.)

- Operational Test (Ref. Step 4.)

The following related test procedures are described in the corresponding page blocks:

- Ref. 24-41-00, P. Block 501 AC External Power Control

- Ref. 26-13-00, P. Block 501 APU Fire and Overheat Detection System

- Ref. 26-22-00, P. Block 501 APU Fire Extinguishing System

- Ref. 49-31-12, P. Block 201 APU Fuel Manifold and Nozzle Test

- Ref. 49-16-00, P. Block 501 Air Intake System Test

- Ref. 49-31-00, P. Block 501 APU Fuel Feed System Test

1. ECB (59KD) Test

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz

Referenced Procedures

- 24-41-00, P. Block 301	AC External Power Control
- 33-17-00, P. Block 501	Memorized Fault Annunciators

B. Procedure

(1)Job Set-Up

(a)On APU panel 429VU: Make certain that APU MASTER SW switch 14KD is in OFF position.

NOTE : On A/C with ECB -9 and previous, On maintenance panel 472VU: Make certain that APU speed is below 7 % RPM.

(b)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(c)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(d)Make certain, that electronics racks ventilation is correct.

(e)Open ECB access door 251JC of LH sidewall stowage compartment.

(2)Read 'ECB/BITE DISPLAY' MFA 52KD

ACTION	RESULT
1. On maintenance panel 472VU: - place ANN LT switch in READ position.	On maintenance panel 472VU: - MFA ECB/BITE DISPLAY 52KD is off, no fault is stored in memory of ECB 59KD. - if MFA ECB/BITE DISPLAY 52KD comes on, a fault is stored in memory of ECB 59KD.
2. Carry out operational test of MFA ECB/BITE DISPLAY 52KD (Ref. 33-17-00, P. Block 501).	

(3)ECB Self Test

ACTION	RESULT
1. On ECB 59KD switch panel: - Place TEST toggle switch in LAMP position for 5 seconds minimum.	On ECB 59KD FAULT DISPLAY matrix and FAULT UNIT matrix: - Each column of display elements comes on for 4 seconds. One column at a time from left to right.
WARNING : IGNITION SYSTEM IS ENERGIZED DURING ECB SELF TEST (BITE TEST).	
2. On ECB 59KD switch panel: - Place TEST toggle switch in SELF position for 5 seconds minimum.	On ECB 59KD FAULT UNIT matrix: - WAIT display element comes on. - TST OK display element comes on for 4 seconds, if self test was successful. - If self test was unsuccessful, relevant display elements come on for 4 seconds each. One display element at a time, from top to bottom and left to right.

(4)Read ECB 'FAULT/DISPLAY/UNIT'

ACTION	RESULT
1. On ECB 59KD switch panel: - Place FAULT toggle switch in DISPLAY position for 5 seconds minimum	On ECB 59KD FAULT DISPLAY matrix: - Relevant display elements come on for 4 seconds in sequence, indicating stored protective shutdowns. On ECB 59KD FAULT UNIT matrix: - the WAIT display element comes on between each FAULT DISPLAY element.

NOTE : The most recent 5 protective shutdowns since last ECB memory erase are stored. The indication sequence is: Last in/First out. Following the protective shutdown display element, associated display elements of Line Repair Units (LRUs), causing the protective shutdown, come on for 4 seconds each on the FAULT UNIT matrix. If up to a maximum of 3 protective shutdowns are stored, TST OK display element comes on for 4 seconds, completing the reading.

2. On ECB 59KD switch panel: - Place FAULT toggle switch in UNIT position for 5 seconds minimum.	On ECB 59KD FAULT UNIT matrix: - Relevant display elements come on for 4 seconds in sequence, indicating stored faulty LRUs. One display element at a time, from top to bottom and left to right. If no LRU fault has been stored since last ECB memory erase, TEST OK display element comes on for 4 seconds.

CAUTION : IF ECB SELF TEST WAS UNSUCCESSFUL OR 'FAULT/DISPLAY/UNIT' READING INDICATES FAULTS, DO THE TROUBLE-SHOOTING BEFORE ECB MEMORY IS ERASED.

3. On ECB 59KD switch panel: - Lift safety guard and place MEMORY ERASE toggle switch to upper position for 5 seconds minimum.	On ECB 59KD FAULT UNIT matrix: - WAIT display element comes on for approx. 20 seconds. - TEST OK display element comes on for 4 seconds.
4. On maintenance panel 472VU: - Carry out operational test of MFA ECB/BITE DISPLAY 52KD (Ref. 33-17-00, P. Block 501).	

**ON A/C 001-004, 006-200,

(5)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close ECB access door 251JC of LH sidewall stowage compartment.
(c)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

**ON A/C 005-005,

(5)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
R (b)Install ECB access panel onto sidewall panel 162PW.
(c)Close BULK cargo compartment door 813 and remove access platform.
(d)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

R **ON A/C ALL

2. APU Generator, Simulated GEN HOT Signal

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

A. Reason for the Job

This maintenance test aims to verify that an APU generator oil temperature condition (oil temperature of 185°C ± 5°C) involves an APU shutdown protection to be performed by the APU GCU and also, the generation of failure messages.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	200 Ohms Resistance
(4)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
(5)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 24-41-00, P. Block 501	AC External Power Control
- 31-51-00, P. Block 501	ECAM System

C. Procedure
(1)Job Set-Up
(a)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Make certain that electronics racks ventilation is correct.
(c)Carry out ECB self test (BITE Test) (Ref. PARA 1).
(d)Carry out Ground Power Control Unit (GPCU) 7XG Periodic Test (Ref. 24-41-00, P. Block 501).
(e)Make certain that all pushbutton switches are relesed out, except ESS and EMER/BUS, GEN 1, GEN 2 and APU GEN pusbuttons switched.
(f)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB/BACK UP/CTL	71KD	B53
131VU	APU/SART	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB/SUPPLY/MAIN	1KD	B57
133VU	ELEC PWR/APU GEN/GCU/SUPPLY	6XS	U83
133VU	ELEC PWR/APU GEN/GCU/WARN	5XS	U84

**ON A/C 001-004, 006-200,

(g)Release pushbutton APU GEN on panel 424VU.
(h)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.
(i)Open access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(j)Release pushbutton APU GEN on panel 424VU.
(k)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.
(i)At BULK cargo compartment.
1 Position access platform 2.3 m (7.5 ft.) and open BULK cargo compartment door 813.
R 2 Remove ECB access panel from sidewall panel 162PW.

**ON A/C ALL

(k)Cut and remove lockwire, and disconnect connector 8XS-A from generator 8XS.
(l)Connect 200 ohms resistance to connector 8XS-A between pins 4 and 8.
(m)Remove circuit breaker safety clips and tags and close circuit breakers 58KD (B52), 71KD (B53), 50KA (B54), 2KD (B56), 1KD (B57) on panel 131VU, and 6XS (U83) and 5XS (U84) on panel 133VU.
(n)Energize the ECAM system (Ref. 31-51-00, P. Block 501).
(o)On ECAM control panel, press CLR pushbutton as many times as necessary to clear left ECAM display unit.

(2)Test

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to ON position.	On APU Air Intake: - APU Air Intake Flap opens. NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
CAUTION : IF NO AUTOMATIC SHUTDOWN OCCURS WITHIN 2 SEC., PLACE APU MASTER SW TO OFF POSITION TO PREVENT APU FROM RUNNING UP.	
- Press START pushbutton to latched position.	On APU panel 429VU: - ON legend comes on. - After approx. 2 sec. FAULT legend comes on. On L ECAM display unit the following message is shown: APU FAULT: AUTO SHUTDOWN - APU MASTER SW .....OFF
2. On APU panel 429VU: - Place APU MASTER SW to OFF position.	On APU panel 429VU: - FAULT legend goes off. On APU Air Intake: - APU Air Intake Flap closes. On L ECAM display unit: APU FAULT: AUTO SHUTDOWN - APU MASTER SW.....OFF message goes off.
3. On Electronic Control Box (ECB)59 KD: - Place FAULT DISPLAY/UNIT switch to DISPLAY position and release. - Press ERASE MEMORY button momentarily.	On ECB front panel DISPLAY section: - GEN HOT display lamp comes on. On completion of erase, after approx. 20 seconds, the TEST OK lamp comes on for 4 seconds.

ACTION	RESULT
4. On maintenance panel 472VU: - Place ANN LT switch to READ position. NOTE : Record all MFA lights that come on.	On maintenance panel 472VU: - The GPCU BITE DISPLAY light comes on.
5. In avionics compartment on Ground Power Control Unit (GPCU) 7XG in panel 81VU: - Press and release FAULT ISOLATE pushbutton. - Press and release MEMORY CLEAR pushbutton.	THE GPCU front face alphanumerical display shows: - APU SHUTDOWN TRIP. - APU OVERTEMP. - Memory clear has been reset. (Ref. 24-41-00, P. Block 501).
6. On maintenance panel 472VU: - Press MFA RESET pushbutton. - Place ANN LT switch to OFF position.	On maintenance panel 472VU: - The GPCU BITE DISPLAY light goes off.

(a)Open safety and tag circuit breakers 58KD (B52), 71KD (B53), 50KA (B54), 2KD (B56), 1KD (B57) on panel 131VU and 6XS (U83), 5XS (U84) on panel 133VU.
(b)Remove 200 ohms resistance from connector 8XS-A and connect connector to generator 8XS.
(c)Secure connector 8XS-A with lockwire 0.8 mm (0.032 in.) dia.

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

**ON A/C 001-004, 006-200,

(2)Close access doors 315AL and 316AR and remove access platform.
(3)Close ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(2)Close access doors 315AL and 316AR and remove access platform
(3)At BULK cargo compartment.
R (a)Install ECB access panel onto sidewall panel 162PW.
(b)Close BULK cargo compartment door 813 and remove access platform.

**ON A/C ALL

(4)Remove safety clips and tags and close circuit breakers 58KD (B52), 71KD (B53), 50KA (B54), 2KD (B56), 1KD (B57) on panel 131VU and 6XS (U83), 5XS (U84) on panel 133VU.
(5)In avionics compartment on ground power control unit (GPCU) 7XG, panel 81VU, press and release MEMORY CLEAR pushbutton. Memory clear has been reset (Ref. 24-41-00, P. Block 501).
(6)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

3. Dry Motoring, Purging, Wet Motoring

A. Dry motoring

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

(1)Reason for the Job
(a)Maintenance practices that require engine rotation without fuel flow and ignition.
(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform, 6 m (20 ft.)
(b)	Circuit Breaker Safety Clips and Tags
(c)	Blanking Caps and Plugs
(d)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(e)	Containers, 2 l (0.53 US gal.) capacity
(f)98A28007570000	Adapter - Vent and Drain Valve, APU
(g)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
(h)	O-Ring
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-41-00, P. Block 301	AC External Power Control

(3)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

	PANEL	SERVICE	IDENT.	LOCATION
R	124VU	APU/FUEL/BLOW OFF/CTL	10QC	D69
R	124VU	APU/FUEL/BLOW OFF/PUMP	11QC	D70
R	124VU	APU/FUEL/PUMP SUPPLY	1QC	D71
R	124VU	APU/FUEL/ISOL VALVE	1QF	D73
R	124VU	APU/START	50KA	E70
R	124VU	APU/ECB MAIN/SUPPLY	1KD	E73

(b)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301) and energize aircraft electrical network.
(c)Make certain, that electronics racks ventilation is correct.

**ON A/C 001-004, 006-200,

(d)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.
(e)Open ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(d)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.
(e)At BULK cargo compartment.
1 Position access platform 2.3 m (7.5 ft.) and open BULK cargo compartment door 813.
2 Remove ECB access panel from sidewall panel 162MW.

**ON A/C ALL

(f)Make certain that exhaust covers are removed and all drain apertures are unobstructed.
(g)Check oil level in gearbox sump, replenish if necessary (Ref. 12-13-49, P. Block 1).

(4)Test

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

CAUTION : CAREFULLY STOW CONNECTOR TO PREVENT ARCING.

(a)Cut and remove lockwire, from electrical connector P4.
1 Disconnect electrical connector P4 from ignition unit and fit blanking cap and plug.
2 Carefully stow connector to prevent arcing.
(b)Cut and remove lockwire, from electrical connector P9.
1 Disconnect fuel solenoid valve electrical connector P9 from fuel control unit and fit blanking cap and plug.
(c)Cut and remove lockwire, from drain plug.
1 Position container below drain tank and remove drain plug. Discard O-ring.
(d)Position container below fuel feed drain port, remove cap and install vent and drain valve adapter P/N 98A28007570000.
(e)Remove safety clips and tags and close circuit breakers 1QC (D71), 1QF (D73), 50KA (E70) and 1KD (E73) on panel 124VU.
(f)Make certain that the following circuit breakers are closed.

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB SUPPLY/BACK UP	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/WARN	2KD	B56

WARNING : MAKE CERTAIN THAT APU AIR INTAKE FLAP AREA IS CLEAR BEFORE OPERATING THE APU MASTER SWITCH.

(g)On APU panel 429VU, place APU MASTER SW to ON position. Check that FUEL PUMP annunciator legend LO PR remains on.
NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
(h)On maintenance panel 472VU, place ANN LT switch to READ position and check that ISOL VALVE annunciator legend OPEN comes on.

CAUTION : 3 CONSECUTIVE START ATTEMPTS ARE ALLOWED WITH A MINIMUM OF 1 MINUTE COOL DOWN BETWEEN EACH ATTEMPT. AFTER THE 3rd ATTEMPT THE STARTER MOTOR MUST COOL DOWN FOR AT LEAST 60 MINUTES.

(j)On APU panel 429VU, press START button. ON and ACCEL annunciator legends come on.

NOTE : START button is self-holding. To cancel start, place APU MASTER SW to OFF position. With N at 42% to 50% or after max. 65 sec., (dependent on acceleration rate), the START button releases and the start circuit is interrupted automatically. APU MASTER SW must be recycled to energize start circuit for additional start sequence.

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.

(k)Motor engine. Do not exceed starter limits.

(l)On APU panel 429VU, place APU MASTER SW to OFF position.

(m)On maintenance panel 472VU, ISOL VALVE annunciator legend SHUT comes on.

R (n)Open safety and tag circuit breakers 1QC (D71),1QF (D73),50KA (E70)
R and 1KD (E73) on panel 124VU

(p)Remove vent and drain valve adapter P/N 98A28007570000 and install fuel feed drain port cap.

1 Remove container.

(q)Fit new O-ring and install drain plug on drain tank.

1 Safety with lockwire.

2 Remove container.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(r)Remove blanking cap and plug and connect electrical connector P4 to ignition unit.

1 Safety electrical connector P4 with lockwire.

(s)Remove blanking cap and plug and connect electrical connector P9 to FCU.

1 Safety electrical connector P9 with lockwire.

(5)Close-Up
(a)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.
(c)Remove safety clips and tags and close circuit breakers 10QC (D69), 11QC (D70), 1QC (D71), 1QF (D73), 50KA (E70) and 1KD (E73) on panel 124VU.
(d)Press ERASE MEMORY pushbutton on ECB 59KD - On completion of erase, after approx. 20 seconds, the TEST ON lamp illuminates for 4 seconds.

**ON A/C 001-004, 006-200,

(e)Close access doors 315AL and 316AR and remove access platform.
(f)Close access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(e)Close access doors 315AL and 316AR and remove access platform.
(f)At BULK cargo compartment.
R (g)Install ECB access panel onto sidewall panel 162PW.
(h)Close BULK cargo compartment door 813 and remove access platform.

**ON A/C ALL

(g)De-energize aircraft electrical circuit and disconnect external power (Ref. 24-41-00, P. Block 301).

B. Purging

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

(1)Reason for the Job

(a)Maintenance practices requiring fuel system purging of air and/or oil entrapments.

(2)Equipment and Materials

ITEM	DESIGNATION
(b)	Circuit Breaker Safety Clips and Tags
(c)	Container, 10 l (2.5 US Gal.) capacity
(d)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz

Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-41-00, P. Block 301	AC External Power Control

(3)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/START	50KA	B54
131VU	APU/ECB MAIN/SUPPLY	1KD	B57

(b)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301) and energize aircraft electrical network.

(c)Make certain that electronics racks ventilation is correct.

R **ON A/C 001-004, 006-200,

(d)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.

(e)Open access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(d)Position access platform 6 m (20 ft). and open access doors 315AL and 316AR.

(e)At BULK cargo compartment.

1 Position access platform 2.3 (7.5 ft.) and open BULK cargo compartment door 813.

2 Remove ECB access panel from sidewall panel 162MW.

**ON A/C ALL

(f)Make certain that exhaust covers are removed and all drain apertures are unobstructed.

(g)Check oil level in gearbox sump. Replenish, if necessary (Ref. 12-13-49, P. Block 1).

(4)Test
(a)Position container below APU primary fuel manifold.
(b)Disconnect primary fuel line at manifold and direct into container.
R (c)Remove safety clips and tags and close circuit breakers
R 50KA (E70) and 1KD (E73) on panel 124VU.
(d)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/PUMP SUPPLY	1QC	A53
131VU	APU/FUEL/LP VALVE CTL	4WF	A62
131VU	APU/FUEL/LP VALVE SUPPLY	2QF	A63
131VU	APU/ECB SUPPLY/BACK UP	58KD	B52
131VU	APU/ECB/BACK UP CTL	71KD	B53
131VU	APU/WARN	2KD	B56
131VU	APU/FUEL/ISOL VALVE CTL	3WF	B62
131VU	APU/FUEL/ISOL VALVE SUPPLY	1QF	B63

WARNING : MAKE CERTAIN THAT APU AIR INTAKE FLAP AREA IS CLEAR BEFORE OPERATING THE APU MASTER SWITCH.
NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
(e)On APU panel 429VU. place APU MASTER SW to on position. FUEL PUMP annunciator legend LO PR comes on. LO PR legend goes off when minimum fuel pressure is reached.
(f)On maintenance panel 472VU, place ANN LT switch to READ position and check that ISOL VALVE annunciator legend OPEN comes on.
CAUTION : 3 CONSECUTIVE START ATTEMPTS ARE ALLOWED WITH A MINIMUM OF 1 MINUTE COOL DOWN BETWEEN EACH ATTEMPT. AFTER THE 3rd ATTEMPT THE STARTER MOTOR MUST COOL DOWN FOR AT LEAST 60 MINUTES.
(g)On APU panel 429VU, press START button. ON and ACCEL annunciator legends come on.
NOTE : START button is self-holding. To cancel start, place APU MASTER SW to OFF position. With N at 42% to 50% or after max. 65 sec., dependent on acceleration rate the START button releases and the start circuit is interrupted automatically. APU MASTER SW must be recycled to energize start circuit for additional start sequence.
NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.
(h)Motor engine. Do not exceed starter limits.
NOTE : Motor engine only long enough to ensure an air-free fuel flow.
(j)On APU panel 429VU, place APU MASTER SW to OFF position.
(k)On maintenance panel 472VU, ISOL VALVE annunciator legend SHUT comes on.
(l)Open, safety and tag circuit breakers 50KA (E70) and 1KD (E73) on panel 124VU.
(m)Connect primary fuel line at manifold and remove container.

(5)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR.
(c)Remove safety clips and tags and close circuit breakers 10QC (D69), 11QC (D70), 50KA (E70) and 1KD (E73) on panel 124VU.
(d)Press ERASE MEMORY pushbutton on ECB 59KD - on completion of erase, after approx. 20 seconds, the TEST OK lamp illuminates for 4 seconds.

**ON A/C 001-004, 006-200,

(e)Close access doors 315AL and 316AR and remove access platform.
(f)Close ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(e)Close access doors 315AL and 316AR and remove access platform.
(f)At BULK cargo compartment.
R 1 Install ECB access panel onto sidewall panel 162PW.
2 Close BULK cargo compartment door 813 and remove access platform.

**ON A/C ALL

(g)De-energize aircraft electrical circuit and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

C. Wet Motoring

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

(1)Reason for the Job

(a)Maintenance practices requiring rotation of engine without ignition.

(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform, 6 m (20 ft.)
(b)	Access platform, 2.3 m (7.5 ft.)
(c)	Circuit Breaker Safety Clips and Tags
(d)	Blanking Cap and Plug
(e)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(f)	Containers, 10 l (2.5 US Gal.) capacity each
(g)	O-Ring
(h)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-41-00, P. Block 301	AC External Power Control

(3)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

	PANEL	SERVICE	IDENT.	LOCATION
R	124VU	APU/FUEL/BLOW OFF/CTL	10QC	D69
R	124VU	APU/FUEL/BLOW OFF/PUMP	11QC	D70
R	124VU	APU/START	50KA	E70
R	124VU	APU/ECB MAIN/SUPPLY	1KD	E73

(b)Connect electrical ground power unit (Ref. 24-41-00, P. Block 301) and energize aircraft electrical network.

(c)Make certain, that electronics racks ventilation is correct.

**ON A/C 001-004, 006-200,

(d)Position access platform, 6 m (20 ft.) and open access doors 315AL and 316AR.

(e)Open ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(d)Position access platform 6 m (20 ft.) and open access doors 315AL and 316AR.
(e)At BULK cargo compartment.
1 Position access platform 2.3 (7.5 ft.) and open BULK cargo compartment door 813.
2 Remove ECB access panel from sidewall panel 162MW.

**ON A/C ALL

(f)Make certain that exhaust covers are removed and all drain apertures are unobstructed.
(g)Check oil level in gearbox sump, replenish if necessary. (Ref. 12-13-49, P. Block 1).

(4)Test

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

CAUTION : CAREFULLY STOW CONNECTOR TO PREVENT ARCING.

(a)Cut and remove lockwire from electrical connector P4.
   1 Disconnect electrical connector P4 from ignition unit and fit blanking cap and plug.
   2 Carefully stow connector to prevent arcing.
(b)Cut and remove lockwire from drain plug.
   1 Position fuel container below drain tank and remove drain plug.
   2 Discard O-ring.
(c)Position fuel container below heat shield and exhaust muffler drain aperture.
(d)Remove safety clips and tags and close circuit breakers 50KA (E70) and 1KD (E73) on panel 124VU.
(e)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/PUMP SUPPLY	1QC	A53
131VU	APU/FUEL LP VALVE CTL	4WF	A62
131VU	APU/FUEL/LP VALVE SUPPLY	2QF	A63
131VU	APU/ECB SUPPLY BACK UP	58KD	B52
131VU	APU/ECB/BACK UP CTL	71KD	B53
131VU	APU/WARN	2KD	B56
131VU	APU/FUEL ISOL VALVE CTL	3WF	B61
131VU	APU/FUEL/ISOL VALVE SUPPLY	1QF	B63

WARNING : MAKE CERTAIN THAT APU AIR INTAKE FLAP AREA IS CLEAR BEFORE OPERATING THE APU MASTER SWITCH.

NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.

(f)On APU panel 429VU, place APU MASTER SW to ON position. FUEL PUMP annunciator LO PR legend comes on. LO PR legend goes off when minimum fuel pressure is reached.
(g)On maintenance panel 472VU, place ANN LT switch to READ position and check that ISOL VALVE annunciator OPEN legend comes on.

CAUTION : 3 CONSECUTIVE START ATTEMPTS ARE ALLOWED WITH A MINIMUM OF 1 MINUTE COOL DOWN BETWEEN EACH ATTEMPT. AFTER THE 3rd ATTEMPT THE STARTER MOTOR MUST COOL DOWN FOR AT LEAST 60 MINUTES.

(h)On APU panel 429VU press START button.

1 ON and ACCEL annunciator legends come on.

NOTE : START button is self-holding. To cancel start, place APU MASTER SW to OFF position. With N at 42% to 50% or after max. 65 sec., (dependent on acceleration rate), the START button releases and the start circuit is interrupted automatically. APU MASTER SW must be recycled to energize start circuit for additional start sequence.

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.

(j)Motor engine. Do not exceed starter limits.

(k)On APU panel 429VU, place APU MASTER SW to OFF position.

(l)On maintenance panel 472VU, ISOL VALVE annunciator legend SHUT comes on.

(m)Open, safety and tag circuit breakers 50KA (E70) and 1KD (E73) on panel 124VU.

(n)Fit new O-ring and install drain plug on drain tank.

1 Safety drain plug with lockwire.

(p)Remove containers.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(q)Remove blanking cap and plug, and connect electrical connector P4 to ignition unit.

1 Safety electrical connector P4 with lockwire.

(5)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Remove safety clips and tags and close circuit breakers 10QC (D69), 11QC (D70), 50KA (E70) and 1KD (E73) on panel 124VU.
(c)Press ERASE MEMORY pushbutton on ECB 59KD - on completion of erase, after approx. 20 seconds, the TEST OK lamp illuminates for 4 seconds.

**ON A/C 001-004, 006-200,

(d)Close access doors 315AL and 316AR and remove access platform.
(e)Close ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(d)Close access doors 315AL and 316AR and remove access platform.
(e)At BULK cargo compartment.
R 1 Install ECB access panel onto sidewall panel 162PW.
2 Close BULK cargo compartment door 813 and remove access platform.

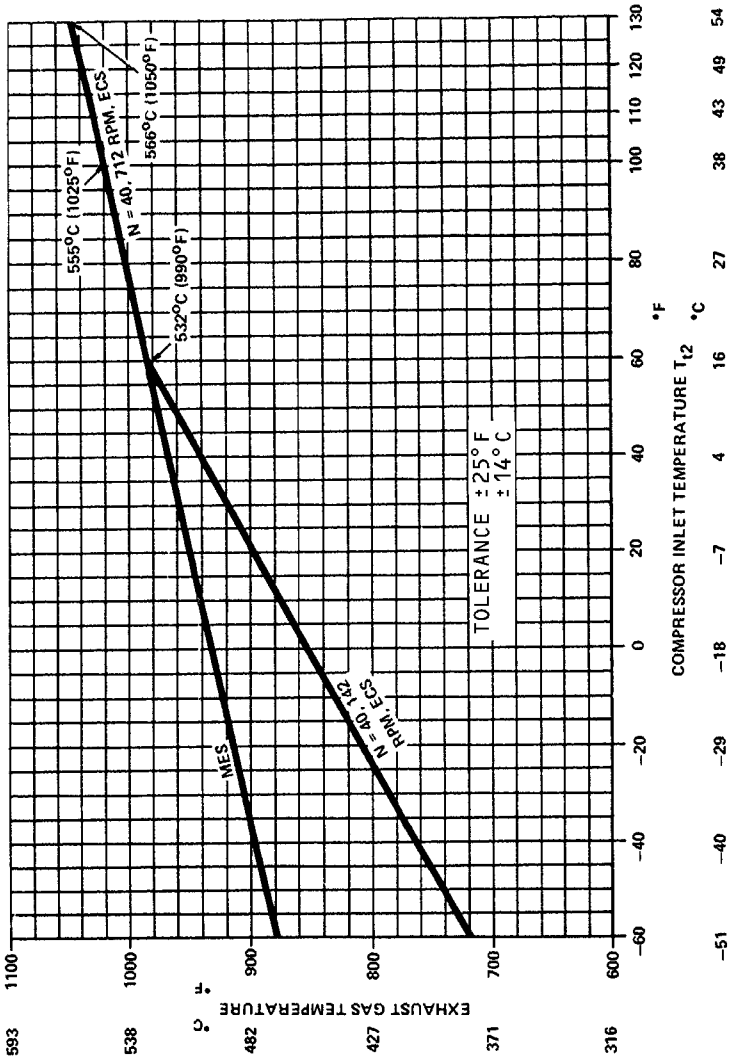
**ON A/C ALL

(f)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

4. Operational Test

A. Reason for the Job
(1)Limitations
(Ref. Fig. 501, 502)

OBSERVATION OR CONDITION	LIMIT REQUIREMENT
Speeds	
No Load	100 % (40,142 RPM)
Electrical Load	100 % (40,142 RPM)
Bleed Load ECS	100 % (40,142 RPM)
Bleed Load MES	101 % (40,712 RPM)
Bleed Load Anti Icing	102 % (41,142 RPM)
Maximum Allowable (Overspeed Shutdown)	107 % (42,952 RPM)
Temperatures	
R EGT (ECS, MES)	532 °C (990 °F)(532 C is only
R	valid for 15 C Ta) (Ref. Fig. 501)
(During Acceleration, up to 50 % rpm)	899 ± 14 °C (1650 ± 25 °F)
(Overtemperature Shutdown Operating Condition)	585 ± 14 °C (1085 ± 25 °F)
Oil (Operating Condition)	between 74 °C (165 °F) and 135 °C (275 °F)
(Overtemperature Shutdown, HOT)	152 °C ± 4 °C (305 ± 7 °F)
Pressures	
Oil (Operating Condition, at Gearbox)	3.45-4.83 bar (50-70 psi)
(Low Oil Pressure Shutdown, LOP)	2.07-2.76 bar (30-40 psi)
Fuel Inlet	0.69-3.79 bar (10-55 psi)
Oil Quantity	
(Max.)	4/4 = 5.7 liters (6.0 qts)
(Min. to start APU)	1/4 on Gage
Leakages	
Mid Bearing Seal and Driven Compressor	
Forward Bearing Vent (Normal)	None (Oil)
(Malfunction)	50 cc/hr (Oil)
Fuel/Oil Pump Drain (Normal)	5 cc/hr (Fuel)
	1 cc/hr (Oil)
(Malfunction)	60cc/min (Fuel)
	150 cc/hr (Oil)
IGV Actuator Drain (Normal)	3 drops/min (Fuel)
(Malfunction)	50 cc/min (Fuel)



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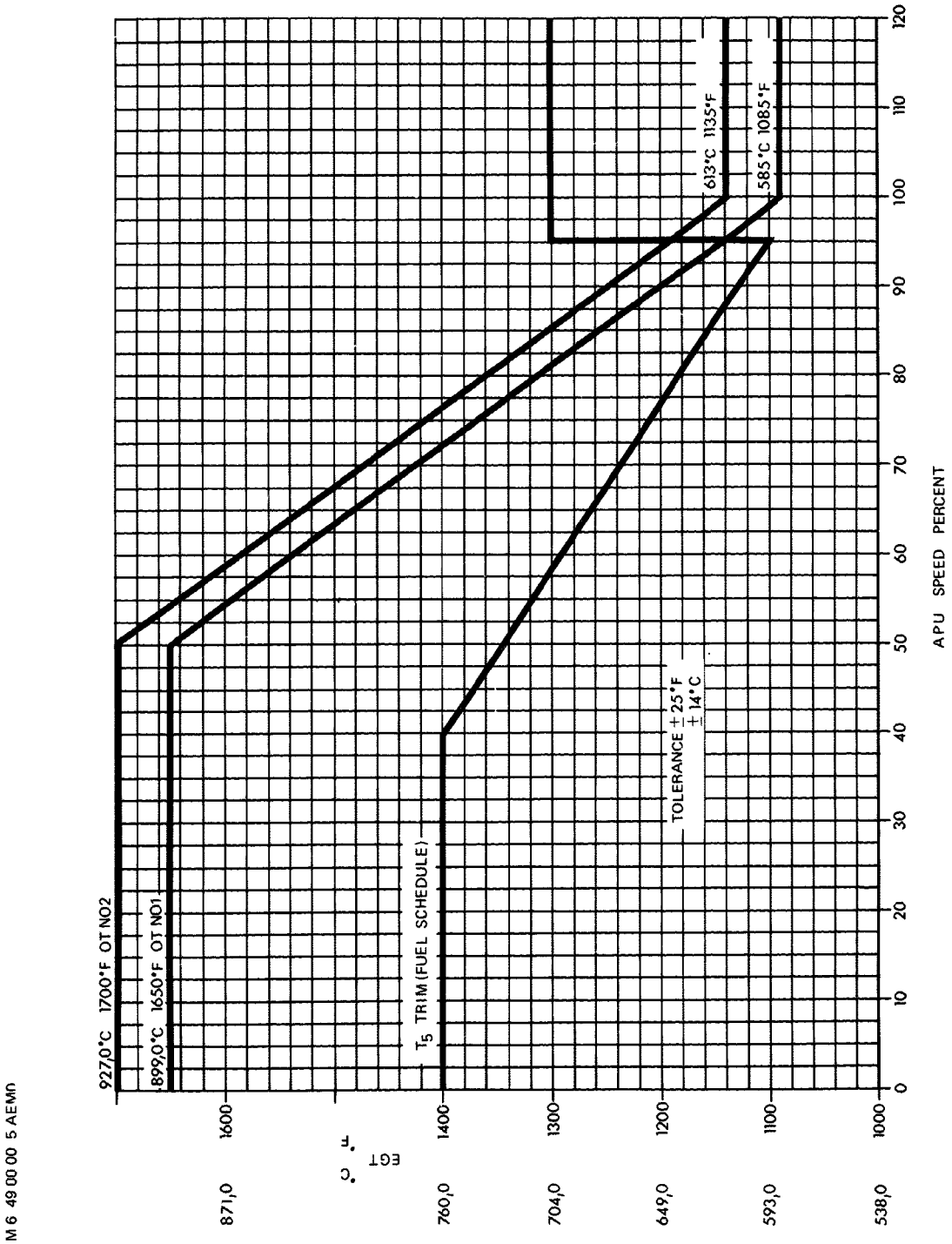
Exhaust Gas Temperature (EGT) as Controlled
by Electronic Control Box
Figure 501



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Temperature Schedule
Figure 502

OBSERVATION OR CONDITION	LIMIT REQUIRMENT
Turbine Plenum Drain (Normal)	None (Fuel)
(Malfunction)	300 cc/false start (Fuel)
Heat Shield Drain (Normal)	None (Fuel)
(Malfunction)	300 cc/false start (Fuel)
Flow Divider Drain (Normal)	75 cc/shutdown (Fuel) 10 cc/startup (Fuel)
(Malfunction)	100 cc/min (Fuel)
Starter Duty Cycle (Starting Operation)	
Below 37000 feet (11278 m)	3 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 3rd attempt the starter motor must cool down for at least 60 minutes.
Above 37000 feet (11278 m)	5 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 5th attempt the starter motor must cool down for at least 60 minutes.
Engine Acceleration Time (Standard Day)	
- Normal operation from time operator initiates start	7 % RPM = 5 seconds 42% to 50 % RPM = 30 seconds (Starter cuts out, DC voltmeter should pulse upward) 95 % RPM = 45 seconds 100 % RPM = 55 seconds

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.

NOTE : With ECB2117402-11 and subsequent installed, at altitudes above 36,000ft. (10,972m), the starter motor cycle is extended and cuts out at 55% rpm engine speed.

(2)Safety Precautions

WARNING : IF APU ACCESS DOORS ARE OPENED OR REMOVED, BEFORE STARTING THE APU MAKE CERTAIN THAT FIRE FIGHTING PERSONNEL AND ADEQUATE FIRE FIGHTING EQUIPMENT IS PRESENT.
DANGER AREAS MUST BE CLEAR OF PERSONNEL, EQUIPMENT, TOOLS AND FOREIGN OBJECTS.

(a)Before starting and operating the APU the following safety precautions must be observed:
- Make certain that all personnel are standing clear of the danger areas (Ref. Para. A.(3)).
- Make certain that fire detection and extinguishing system is serviceable (Ref. 26-13-00, P. Block 501 and 26-22-00, P. Block 501).
- Make certain that all blanking plugs and covers are removed.
- Make certain that A/C fuel system and APU fuel system are serviceable and fuel quantity is adequate.
- Make certain that drain apertures are not obstructed.
- The APU drain tank has to be drained after a series of three shut-downs without flying (Ref. 49-17-11, P. Block 401).
- APU emergency shutdown must be carried out immediately (Ref. 49-62-00, P. Block 1), if any of the limitations (Ref. Para. A step (1) are exceeded or any of the following conditions occur:
  . smoke
  . unusual noises
  . fuel or oil leakage
- Do not exceed starter duty cycle (Ref. Para. A).

(b)In case of APU fire on ground, interrupt start or operation immediately and carry out one of the following actions:

1 On APU FIRE control module 20WG:
- Pull APU FIRE handle
- Press AGENT pushbutton, if necessary

2 On nose landing gear ground interphone box 3WC:
- Press APU SHUT OFF pushbutton.

(c)Danger Areas

1 Exhaust
- up to 20 m (60 ft.) from the APU exhaust duct
- more than 3 m (10 ft.) above ground level
- as wide as horizontal stabilizer

2 Air Intake and Oil Cooler Air Outlet
- area of 2 m (6 ft.) dia. around the APU air intake.
- area around the oil cooler air outlet.

B. Operational Test, Battery Assisted APU Start

NOTE : For Operational Test with Ground Power Assisted APU Start refer to Para. C.

Referenced Procedures

- 12-13-49, P. Block 1 — APU - Replenishing
- 24-23-00, P. Block 301 — Auxiliary AC Generation
- 30-11-00, P. Block 501 — Wing Ice Protection
- 31-51-00, P. Block 501 — ECAM System
- 33-17-00, P. Block 501 — Memorized Fault Annunciators
- 71-00-00, P. Block 501 — Power Plant

(1)Procedure

(a)Job Set-Up

1 Energize aircraft electrical network (Ref. 24-23-00, P. Block 301).

2 Make certain that the following circuit breakers are closed.

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/PUMP SUPPLY	1QC	A53
131VU	APU/IND/OIL QTY	1KK	A54
131VU	APU/IND/N	1KN	A55
131VU	APU/IND/EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB/TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB/B	2WF	A61
131VU	APU/FUEL/LP VALVE/CTL	4WF	A62
131VU	APU/FUEL/LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB/BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP/A	1WG	B59
131VU	APU/FIRE EXTING/AUTO/EXTING/GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB/A	1WF	B61
131VU	APU/FUEL/ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL/ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/COMP TEMP/APU BLEED/VALVE/ CTL & WARN	4HV	G55
133VU	ELEC/APU GEN/GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN/GCU/WARN	5XS	U84
133VU	HYD/L/G PROX DET/RELAYS/SYS 2 GEAR/ DOWN/OVHD PNL/POS IND	83GB	V51

(b)Pre-start checks

ACTION	RESULT

ACTION	RESULT
CAUTION : BAT PUSHBUTTONS MUST BE IN AUTO POSITION DURING APU OPERATION TO ENSURE THAT FIRE PROTECTION SYSTEM IS OPERATIVE AT ALL TIMES.	
1. On ELEC PWR panel 424VU:	On ELEC PWR panel 424VU:
- Make certain that BAT pushbuttons are in AUTO position.	- OFF/R legend is off. - Flowbars are on. - AC EMER ON INV annunciator is ON.
- Make certain, that APU GEN pushbutton is released.	- OFF/R legend is on.
2. On ELEC IND panel 425VU:	On ELEC IND panel 425VU:
- Rotate DC volts/amps selector through BAT positions.	- DC V indicator shows each battery voltage 28 V normal, 25 V min.
3. On AIR BLEED panel 436VU:	On AIR BLEED panel 436VU:
- Make certain, that APU BLEED switch is in OFF/R position.	- Flowbar is off.
4. On FUEL panel 430VU:	On FUEL panel 430VU:
- Make certain that all PUMP push-buttons are released.	- OFF legends are on.
- Make certain that LH INR TK ISOL VALVE pushbutton is pressed.	- OFF legend is off. - Flowbar is on.
- Make certain that APU LP VALVE is open.	- SHUT legend is off. - Flowbar is on.
5. On maintenance panel 472VU:	On maintenance panel 472VU:
- Check OIL QTY indication and replenish if necessary (Ref. 12-13-49, P. Block 1).	- Min. quantity indication: 1/4 on gage.
- Place switch ANN LT in READ position.	- If any fault information is stored, refer to TSM.
- Carry out MFA test (Ref. 33-17-00, P. Block 501).	
6. On APU panel 429VU:	
- Make certain, that FUEL PUMP pushbutton is in AUTO position.	

(c)Starting

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to ON position.	On APU panel 429VU: - FUEL PUMP legend LO PR comes on. - LO PR legend goes off when minimum fuel pressure is reached. On maintenance panel 472VU: - ISOL VALVE annunciator legend OPEN comes on. On APU Air Intake: - APU Air Intake Flap opens. NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
2. On APU panel 429VU: - Press START pushbutton 2KA to latched position.	On APU panel 429VU: - START pushbutton ON legend comes on. On ECB (59KD). - Pre-start BITE test is initiated. NOTE : This will inhibit APU start until accomplishment after approx. 2 seconds.
- Record start time.	On APU panel 429VU: - START pushbutton ACCEL legend comes on if ECB pre-start BITE test is accomplished and Air Intake Flap is fully open.
3. Continuously monitor N and check acceleration: - Check at 7% N.	On maintenance panel 472VU: - N indication increases. - EGT rising. - Steady: Surge free rise of EGT and N indications.
- Check at 42% to 50% N.	On APU panel 429VU: - START pushbutton ON legend goes off. - START pushbutton releases automatically. On maintenance panel 472VU: - N indication rises. - EGT indication increases.

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.

ACTION	RESULT
- Check at 95% N.	On APU panel 429VU: - START pushbutton ACCEL legend goes off. - On annunciator 8KA AVAIL legend comes on. - On maintenance panel 472VU: EGT within limits. (Ref. Fig. 502).

R

CAUTION : WITH START SEQUENCE INITIATED USING BATTERY POWER, SET APU GENERATOR ON LINE TO AVOID DISCHARGE OF BATTERIES.

(d)Set APU generator on line

ACTION	RESULT
1. On ELEC PWR panel 424VU: - Press APU GEN pushbutton.	On ELEC PWR panel 424VU: - OFF/R legend goes off. - Annunciators AC BUS 1 OFF and AC BUS 2 OFF go off. - Annunciator AC EMERG ON INV goes off. - Flowbars are on. NOTE : Flowbars are on when batteries are under charge. When batteries reach fully charge condition flowbars go off.
- Make certain, that the electronics racks ventilation is correct.	
2. Energize ECAM system (Ref. 31-51-00, P. Block 501).	
- On ECAM SDU: - Select APU page.	On ECAM SDU: - AVAIL legend is on. On maintenance panel 472VU and ECAM SDU: - EGT and RPM within limits.
3. 30 sec. after reaching 95% N. NOTE : If necessary, press APU pushbutton on ECAM control panel. APU page comes on.	On ECAM SDU: - APU page goes off. On maintenance panel 472VU and ECAM SDU: - N indication reads 100%.
4. On ELEC IND panel 425VU: - Rotate AC selector to APU GEN position and check indications.	On ELEC IND panel 425VU: - AC LOAD, AC V and FRQ HZ indications (115V and 400Hz) with a possible little deviation.

(e)For Feeding APU Fuel System use LH Inner Tank Pump 2:

ACTION	RESULT
1. On FUEL panel 430VU: - Press LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend goes off.

(f)Apply pneumatic load.

ACTION	RESULT
1. On AIR BLEED panel 436VU: - Place APU BLEED switch to ON position. - Make certain that X-FEED push-button is in AUTO position.	On AIR BLEED panel 436VU: - Flowbar comes on. - Flowbar is in line.
2. On COMPT TEMP panel 437VU: - Press PACK VALVE 1 and PACK VALVE 2 pushbuttons.	On COMPT TEMP panel 437VU: - Flowbars come on. - OFF legends go off. On maintenance panel 472VU and ECAM SDU: - N indication at 100%. - EGT within limits. (Ref. Fig. 501).
3. On COMPT TEMP panel 437VU: - Release PACK VALVE 1 and PACK VALVE 2 pushbuttons.	On COMPT TEMP panel 437VU: - Flowbars go off. - OFF indicator lights come on.
CAUTION : OBSERVE ALL RELEVANT PRECAUTIONS, LIMITATIONS AND PROCEDURES FOR FOLLOWING OPERATION.	
4. Carry out Dry Motoring procedure of Main Engines (Ref. 71-00-00, P. Block 501).	
5. On AIR BLEED panel 436VU: - Place APU BLEED switch to OFF/R position.	On AIR BLEED panel 436VU: - Flowbar goes off. - X-FEED flowbar is crossline.

(g)Shutdown

ACTION	RESULT
1. On FUEL panel 430VU: - Release LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend comes on.

ACTION	RESULT
2. On APU panel 429VU: - Place APU MASTER SW to OFF position.	On APU panel 429VU: - Annunciator AVAIL legend goes off. On ECAM SDU: - AVAIL legend goes off. On AIR BLEED panel 436: - APU BLEED annunciator flowbar comes on to indicate the position of the APU bleed valve. In line: the valve is open. Off: the valve is closed. On maintenance panel 472VU and ECAM SDU: - ISOL VALVE annunciator OPEN legend goes off and annunciator SHUT legend comes on. - EGT and N indications decrease. - EGT indication deflects up scale momentarily due to ECB self test of overtemperature shutdown circuit. On ELEC PWR panel 424VU: - OFF/R legend goes off. - Flowbars come on - AC EMER ON INV annunciator comes on.
3. At 95 % N: -	- APU fuel pump is de-energised. - APU isolation valve shuts. ECAM system goes off:
4. At 7 % N:	- ECB is de-energised. On APU Air Intake: - APU Air Intake Flap closes.
5. 60 sec. after N decreases to 7%, indication circuits are de-energized.	On maintenance panel 472VU: - EGT and N indicates zero.
6. On maintenance panel 472VU: - Place ANN LT switch in READ position. - Carry out MFA test (Ref. 33-17-00, P. Block 501).	- If any fault information is stored, refer to TSM.

(h)Close-Up
1 De-energize appropriate systems which were used for test requirements.
2 De-energize aircraft electrical network (Ref. 24-23-00, P. Block 301).
3 Make certain that working area is clean and clear of tools and mis-

cellaneous items of equipment.

C. Operational Test, Ground Power Assisted APU Start

NOTE : For Operational Test with Battery Assisted APU Start refer to Para. B.

(1)Equipment and Materials

ITEM	DESIGNATION
(a)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-41-00, P. Block 301	AC External Power Control
- 30-11-00, P. Block 501	Wing Ice Protection
- 31-51-00, P. Block 501	ECAM System
- 33-17-00, P. Block 501	Memorized Fault Annunciators
- 71-00-00, P. Block 501	Power Plant

(2)Procedure

(a)Job Set-Up

1 Connect electrical ground power unit (Ref. 24-41-00, P. Block 301) and energize aircraft electrical network.

2 Make certain that electronics racks ventilation is correct.

3 Make certain that the following circuit breakers are closed.

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/PUMP SUPPLY	1QC	A53
131VU	APU/IND/OIL QTY	1KK	A54
131VU	APU/IND/N	1KN	A55
131VU	APU/IND/EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB/TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB/B	2WF	A61
131VU	APU/FUEL/LP VALVE/CTL	4WF	A62
131VU	APU/FUEL/LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB/BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP/A	1WG	B59
131VU	APU/FIRE EXTING/AUTO/EXTING/GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB/A	1WF	B61
131VU	APU/FUEL/ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL/ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/COMP TEMP/APU BLEED/VALVE CTL & WARN	4HV	G55
133VU	ELEC/APU GEN/GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN/GCU/WARN	5XS	U84
133VU	HYD/L/G PROX DET/RELAYS/SYS 2 GEAR DOWN/OVHD PNL/POS IND	83GB	V51

4 Energize ECAM system (Ref. 31-51-00, P. Block 501) and select APU page.

(b)Pre-start checks

ACTION	RESULT
CAUTION : BAT PUSHBUTTONS MUST BE IN AUTO POSITION DURING APU OPERATION TO ENSURE THAT FIRE PROTECTION SYSTEM IS OPERATIVE AT ALL TIMES.	
1. On ELEC PWR panel 424VU:	On ELEC PWR panel 424VU:
- Make certain that BAT pushbuttons are in AUTO position.	- OFF/R legend is off. - Flowbars are on. NOTE : Flowbars are on when batteries are under charge. When batteries reach fully charge condition flowbars go off.
- Make certain, that APU GEN pushbutton is released.	- OFF/R legend is on.
2. On ELEC IND panel 425VU:	On ELEC IND panel 425VU:
- Rotate DC volts/amps selector through BAT positions.	- DC V indicator shows each battery voltage 28 V normal, 21 V min.
3. On AIR BLEED panel 436VU:	On AIR BLEED panel 436VU:
- Make certain, that APU BLEED switch is in OFF/R position.	- Flowbar is off.
4. On FUEL panel 430VU:	On FUEL panel 430VU:
- Make certain that all PUMP push-buttons are released.	- OFF legends are on.
- Press LH INR TK PUMP 2 pushbutton.	- OFF legend goes off.
- Make certain that LH INR TK ISOL VALVE pushbutton is pressed.	- OFF legend is off. - Flowbar is on.
- Make certain that APU LP VALVE is open.	- SHUT legend is off. - Flowbar is on.
5. On maintenance panel 472VU:	On maintenance panel 472VU:
- Check OIL QTY indication and replenish if necessary (Ref. 12-13-49, P. Block 1).	- Min. quantity indication, 1/4 on gage.
- Place switch ANN LT in READ position.	- If any fault information is stored, refer to TSM.
- Carry out MFA test (Ref. 33-17-00, P. Block 501).	
6. On APU panel 429VU:	
- Make certain that FUEL PUMP pushbutton is in AUTO position.	

(c)Starting

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to ON position.	On APU panel 429VU: - FUEL PUMP legend LO PR comes on. - LO PR legend goes off when minimum fuel pressure is reached. On APU maintenance panel 472VU: - ISOL VALVE annunciator legend OPEN comes on. On ECAM SDU: - APU page comes on. On APU AIR Intake: - APU Air Intake Flap opens. NOTE : APU start is inhibited for 30 seconds minimum to allow Air Intake Flap to open.
2. On APU panel 429VU: - Press START pushbutton 2KA to latched position.	On APU panel 429VU: - START pushbutton ON legend comes on. On ECB (59KD): - Pre-start BITE test is initiated. NOTE : This will inhibit APU start until accomplishment after approx. 2 seconds.
- Record start time.	On APU panel 429VU: - START pushbutton ACCEL legend comes on, if ECB pre-start BITE test is accomplished and Air Intake Flap is fully open.
3. Continuously monitor N and check acceleration:	On maintenance panel 472VU and ECAM SDU: - N indication increases.
- Check at 7% N.	- ACCEL legend comes on. - EGT rising. - Steady: Surge free rise of EGT and N indications.
- Check at 42% to 50% N.	On APU panel 429VU: - START pushbutton ON legend goes off. - START pushbutton releases automatically. On maintenance panel 472VU: - N indication rises. - EGT indication increases.

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original

ACTION	RESULT
tolerance of 42%. This is an indication lag and does not affect the operation of the APU.	
- Check at 95% N.	On APU panel 429VU: - START pushbutton ACCEL legend goes off. - On annunciator 8KA AVAIL legend comes on. On ECAM SDU: - AVAIL legend comes on. On maintenance panel 472VU and ECAM SDU: - EGT within limits.
4. 30 sec. after reaching 95% N.	On ECAM SDU: - APU page goes off.
NOTE : If necessary, press APU pushbutton on ECAM control panel. APU page comes on.	
	On maintenance panel 472VU and ECAM SDU: - N indication reads 100%.

(d)Set APU generator on line:

NOTE : When using ground power, it is not necessary to set the APU generator on line.

ACTION	RESULT
1. On ELEC PWR panel 424VU: - Press APU GEN pushbutton.	On ELEC PWR panel 424VU: - OFF/R legend goes off.
2. On ELEC IND panel 425VU: - Rotate AC selector to APU GEN position and check indications.	On ELEC IND panel 425VU: - AC LOAD, AC V and FRQ HZ indications within limits.

(e)Apply pneumatic load

ACTION	RESULT
1. On AIR BLEED panel 436VU: - Place APU BLEED switch to ON position. - Make certain that X-FEED push-button is in AUTO position.	On AIR BLEED panel 436VU: - Flowbar comes on. - Flowbar is in line.
2. On COMPT TEMP panel 437VU: - Press PACK VALVE 1 and PACK VALVE 2 pushbuttons.	On COMPT TEMP panel 437VU: - Flowbars come on. - OFF legends go off. On maintenance panel 472VU and ECAM SDU: - N indication at 100%. - EGT within limits.
3. On COMPT TEMP panel 437VU: - Release PACK VALVE 1 and PACK VALVE 2 pushbuttons.	On COMPT TEMP panel 437VU: - Flowbars go off. - OFF indicator lights come on.

CAUTION : OBSERVE ALL RELEVANT PRECAUTIONS, LIMITATIONS AND PROCEDURES FOR FOLLOWING OPERATION.

4. Carry out Dry Motoring procedure of Main Engines (Ref. 71-00-00, P. Block 501).	
5. On AIR BLEED panel 436VU: - Place APU BLEED switch to OFF/R position.	On AIR BLEED panel 436VU: - Flowbar goes off. - X-FEED flowbar is crossline.

(f)Shutdown

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to OFF position.	On APU panel 429VU: - Annunciator AVAIL legend goes off. On ECAM SDU: - AVAIL legend goes off. On AIR BLEED panel 436VU: - APU BLEED annunciator flowbar comes on to indicate the position of the APU bleed valve. On line: the valve is open. Off: the valve is closed. On maintenance panel 472VU and ECAM SDU: - EGT and N indications decrease. - EGT indication deflects up scale momentarily due to ECB self test of overtemperature shutdown circuit.
2. At 95 % N.	On APU panel 429VU: - On annunciator 8KA AVAIL legend goes off. - ECAM goes off - APU fuel pump is de-energised
3. At 7 % N:	- ECB is de-energised
4. 60 sec. after N decreases to 7%, indication circuits are de-energized.	On maintenance panel 472VU: - EGT and N indicate zero. On maintenance panel 472VU and ECAM SDU: - ISOL VALVE annunciator OPEN legend goes off and annunciator SHUT legend comes on. On APU Air Intake: - APU Air Intake Flap closes.
5. On FUEL panel 430VU: - Release LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend comes on.

ACTION	RESULT
6. On maintenance panel 472VU: - Place ANN LT switch in READ position. - Carry out MFA test (Ref. 33-17-00, P. Block 501).	On maintenance panel 472VU: - If any fault information is stored, refer to TSM.

(g)Close-Up
1 De-energize ECAM system (Ref. 31-51-00, P. Block 501) and appropriate systems used for test requirements.
2 De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
3 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

5. Functional Test of APU Pneumatic System

A. Reason for the Job
This functional test verifies the serviceability of the APU Pneumatic System. For accomplishment of the test, following electrical signals are available at the Electronic Control Box 59KD (ECB) Test Connector J12 (J12 Connector):
- Inlet Guide Vane Actuator Torque Motor (IGVA TM) Command
- Inlet Guide Vane Actuator Linear Variable Differential Transformer (IGVA LVDT) Feedback
- Surge Control Valve Torque Motor (SCV TM) Command
- Fuel Control Unit Torque Motor (FCU TM)
- Bleed Load Valve Solenoid (Load Valve)
- Environmental Control System (ECS) Demand

B. Equipment and Materials

ITEM	DESIGNATION
1.	Access Platform, 2.3 m (7.5 ft.)
2.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
3.	Digital Multimeter, 50 V Range, Input Impedance >10 Megohms
Referenced Procedures	
- 21-61-00, P. Block 501	Pack Temperature Control
- 23-44-00, P. Block 1	Cabin and Service Interphone
- 24-41-00, P. Block 301	AC External Power Control
- 30-11-00, P. Block 501	Wing Ice Protection
- 31-51-00, P. Block 501	ECAM System
- 49-61-11, P. Block 401	Electronic Control Box (59KD)
- 49-70-00, P. Block 1	Indicating
- 71-00-00, P. Block 501	Power Plant

C. Procedure

(1)Job Set-Up

(Ref. Fig. 503)

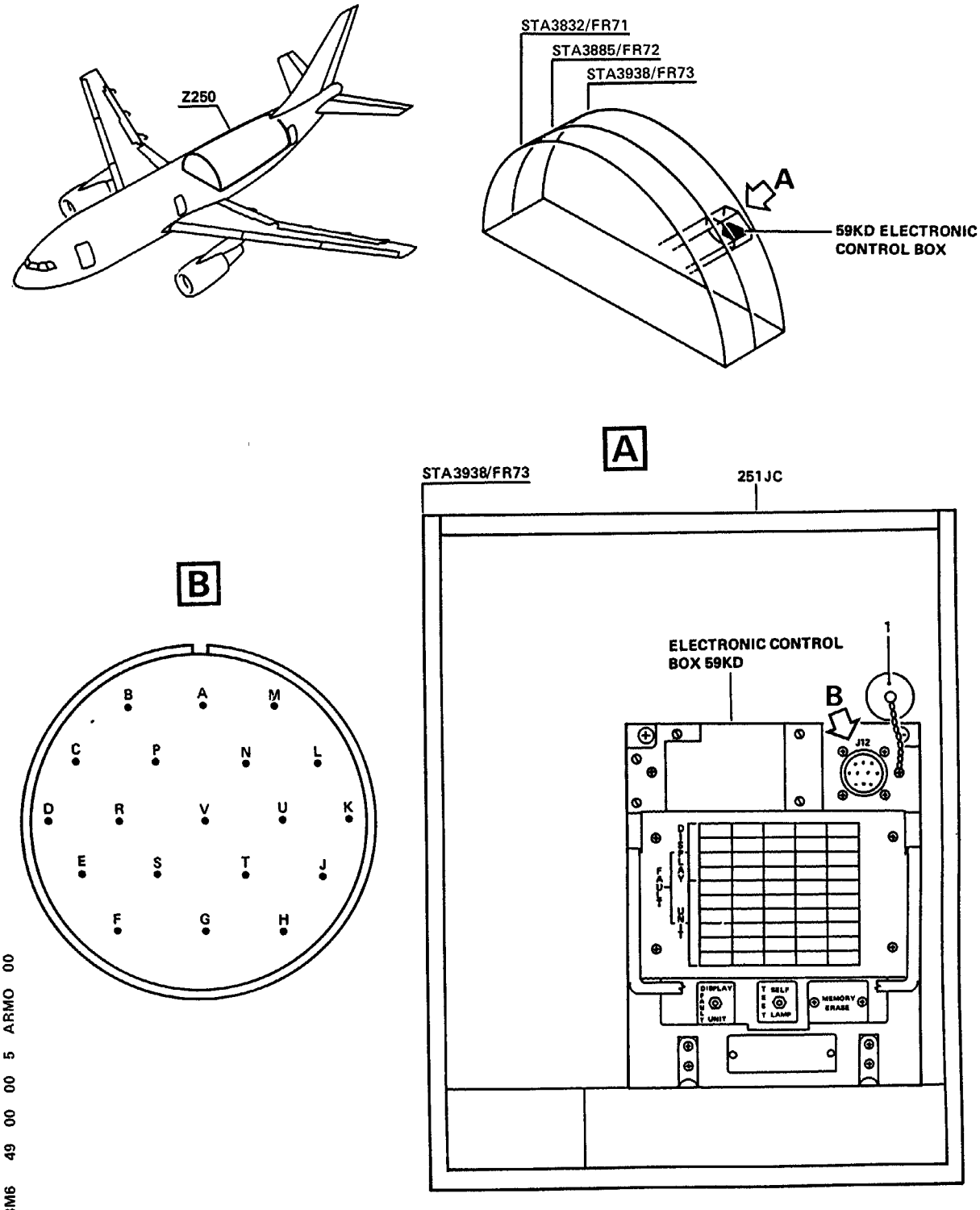
**ON A/C 001-004, 006-200,

(a)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Make certain, that electronics racks ventilation is correct.
(c)Activate service interphone system (Ref. 23-44-00, P. Block 1).
(d)Open ECB access door 251JC of LH sidewall stowage compartment.

**ON A/C 005-005,

(a)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Make certain, that electronics racks ventilation is correct.
(c)Position access platform and open BULK cargo compartment door 813.
(d)Activate service interphone system (Ref. 23-44-00, P. Block 1).
R 1 Remove ECB access panel from sidewall panel 162PW.

**ON A/C ALL



Electronic Control Box (59KD)
Location and Front Panel with Test Connector J12
Figure 503

(e)Carry out ECB (59KD) Test (Ref. Para. 1.).
(f)Remove protective cap (1) from test connector J12.
(g)Start and operate APU with no load (Ref. Para. 4).
(h)Energize ECAM system and select APU page (Ref. 31-51-00, P. Block 501).
(j)Press 'APU' pushbutton switch on ECAM control panel, to select APU page on R ECAM SDU if necessary (Ref. 49-70-00, P. Block 1).
NOTE : Exhaust Gas Temperature (EGT) and APU speed (N) are also indicated on maintenance panel 472VU.

CAUTION : IF THE A/C ELECTRICAL SUPPLY MUST BE ACHIEVED BY THE APU GENERATOR, MAKE CERTAIN THAT THE APU GENERATOR ELECTRICAL LOAD DURING THE FOLLOWING TEST PROCEDURES IS LESS THAN 20%, TO AVOID APU INLET GUIDE VANE CLOSING.

CAUTION : MAKE CERTAIN THAT ECB ADJUSTMENT SWITCHES S1 THRU S6 ARE IN CORRECT POSITION (Ref. 49-61-11, P. Block 401).

CAUTION : OBSERVE ALL RELEVANT PRECAUTIONS, LIMITATIONS AND PROCEDURES FOR FOLLOWING OPERATIONS.

(2)Functional Test
(a)Pressurize the A/C Pneumatic System.

ACTION	RESULT
1. Pressurize A/C pneumatic system	On R ECAM SDU: - EGT reads within limits. - APU BLEED VALVE flowbar in open position. - APU BLEED pressure reads min. 10 psi.

(b)Check ECS demand (for ECB 11 and subsequent)

ACTION	RESULT
1. Operate PACK 1 and PACK 2 with COLD mode selected (Ref. 21-61-00, P. Block 501).	On R ECAM SDU: - N indication reads 100%. - EGT reads within limits.
2. Check ECS Demand Signal on J12 Test Connector. - Connect multimeter to pin L (+) and pin M (-).	On Multimeter: - ECS Demand Signal reading is minimum 8 V.
3. Check IGVA TM on J12 Test Connector. - Connect Multimeter to pin U (+) and pin C (-). NOTE : Approx. 640 mV indicate IGVA TM steady state, the IGVs are in the correct position as computed by the ECB. UP to 1280 mV can be measured in the first seconds if IGVs are moving from fully closed to open position.	On Multimeter: - Reading is approx. 640 mV.
4. Check SCV TM on J12 Test Connector. - Connect Multimeter to pin V (+) and pin C (-).	On Multimeter: - Reading is up to 2 V. NOTE : SCV TM voltage is oscillating, not reaching steady state in the short time in which anti-icing mode is available. A voltage >2 V indicates a fully closed SCV. A voltage of 0 V indicates a fully open SCV. On R ECAM SDU: - BLEED pressure is min. 20 psi. NOTE : Lower bleed air pressure indicates surge control loop error.
5. Check FCU TM on J12 Test Connector. - Connect Multimeter to pin E (+) and pin C (-).	On Multimeter: - Reading is between 3 V and 5 V.
6. Check IGV position IGVA LVDT signal on J12 Test Connector. - Connect Multimeter to pin D (+) and pin C (-).	On Multimeter: - Reading is between 4.22 V and 6.13 V.

ACTION	RESULT
7. Complete operation of packs with COLD mode selected (Ref. 21-61-00, P. Block 501).	On R ECAM SDU: - N indication reads 100%. - EGT reads within limits.

(c)Check MES Mode (for ECB 11 and subsequent)

ACTION	RESULT
1. Accomplish MES/Dry Motoring (Ref. 71-00-00, P. Block 501).	On R ECAM SDU: - N indication reads 101%. - EGT reads within limits.
2. Check IGVA TM on J12 Test Connector: - Connect Multimeter to pin U (+) and pin C (-).	On Multimeter: - Reading is approx. 640 mV. NOTE : Approx 640 mV indicate IGV TM steady state, the IGVs are in correct position, computed by ECB. Up to 1280 mV can be measured in the first seconds, if IGVs are moving from fully closed to open position.
3. Check SCV TM on J12 Test Connector: - Connect Multimeter to pin V (+) and pin C (-).	On Multimeter: - Reading is up to 2 V. NOTE : SCV TM voltage is oscillating. A voltage >2 V indicates a fully closed SCV. A voltage of 0 V indicates a fully open SCV. - On R ECAM SDU: BLEED pressure is min. 30 psi. NOTE : Lower bleed air pressure indicates surge control loop error.
4. Check FCU TM on J12 Test Connector. - Connect Multimeter to pin E (+) and pin C (-).	On Multimeter: - Reading is between 3 V and 5 V.
5. Check IGV position IGVA LVDT signal on J12 Test Connector. - Connect Multimeter to pin D (+) and pin C (-).	On Multimeter: - Reading is approx. 6.6 V.
6. Complete MES/Dry Motoring (Ref. 71-00-00, P. Block 501).	On R ECAM SDU: - N indication reads 100%. - EGT reads within limits.

(d)Check De-Ice Mode (for ECB 11 and subsequent)

NOTE : After wing ice protection selected for 10 seconds on the ground, the system will be de-activated automatically, thus preventing possible damage to the slats by overheating.

ACTION	RESULT
1. Accomplish Wing Ice Protection (Ref. 30-11-00, P. Block 501).	On R ECAM SDU: - N indication reads 102%. - EGT reads within limits.
2. Check IGVA TM on J12 Test Connector. - Connect multimeter to pin U (+) and pin C (-). NOTE : Approx. 640 mV indicate IGV TM steady state, the IGVs are in correct position as computed by the ECB. Up to 1280 mV can be measured in the first seconds if IGVs are moving from fully closed to open position.	On Multimeter: - Reading is approx. 640 mV.
3. Check SCV TM on J12 Test Connector. - Connect Multimeter to pin V (+) and pin C (-).	On Multimeter: - Reading is up to 2 V. NOTE : SCV TM voltage is oscillating, not reaching steady state in the short time in which anti-ice mode is available. A voltage >2 V indicates a fully closed SCV. A voltage of 0 V indicates a fully open SCV. On R ECAM SDU: - BLEED pressure is min. 20 psi. NOTE : Lower bleed air pressure indicates surge control loop error.
4. Check FCU TM on J12 Test Connector. - Connect Multimeter to pin E (+) and pin C (-).	On Multimeter: - Reading is between 3 V and 5 V.
5. Check IGV position IGVA LVDT signal on J12 Test Connector. - Connect Multimeter to pin D (+) and pin C (-).	On Multimeter: - Reading is approx. 6.6 V.
6. Complete wing Ice Protection (Ref. 30-11-00, P. Block 501). and pin C (-).	On R ECAM SDU: - N indication reads 100%. - EGT reads within limits.

(e)Depressurize the A/C Pneumatic System.

ACTION	RESULT
1. Depressurize A/C pneumatic system	On R ECAM SDU: - EGT within limits. - APU BLEED VALVE flowbar in closed position. - No APU BLEED pressure indicated.

NOTE : An aircraft bleed ducting pressure of maximum 6 psi may be observed after APU BLEED is selected to OFF (APU Bleed Load Valve is selected to closed). This represents the normal condition, with no detrimental effect on aircraft operation.

**ON A/C 001-004, 006-200,

(3)Close-Up
(a)Shut down APU (Ref. Para. 4).
(b)Carry out ECB (59KD) Test (Ref. Para. 1).
(c)Install protective cap (1) onto test connector J12.
(d)Make certain, that working area is clean and clear of tools and miscellaneous items of equipment.
(e)Close ECB access door 251JC of LH sidewall stowage compartment.
(f)Deactivate service interphone system (Ref. 23-44-00, P. Block 1).
(g)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

**ON A/C 005-005,

(3)Close-Up
(a)Shut down APU (Ref. Para. 4).
(b)Carry out ECB (59KD) Test (Ref. Para. 1).
(c)Install protective cap (1) onto test connector J12.
(d)Make certain, that working area is clean and clear of tools and miscellaneous items of equipment.
R (e)Install ECB access panel onto sidewall panel 162PW.
(f)Deactivate service interphone system (Ref. 23-44-00, P. Block 1).
(g)Close BULK cargo compartment door 813 and remove access platform.
(h)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS. SOLVENT VAPORS ARE TOXIC AND FLAMMABLE.
CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. AVOID INHALATION OF FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : MAKE CERTAIN THAT THE A/C'S NOSE FACES INTO WIND.
BEWARE OF VAPOURIZED CLEANING FLUID, BLOWN OUT OF COOLING FAN AND BLEED LOAD VALVE.

WARNING : MAKE CERTAIN THAT PRESSURIZED CONTAINER IS COMPLETELY DEPRESSURIZED BEFORE OPENING.

CAUTION : CHECK ACCESS PLATFORM AND APU COMPARTMENT FOR MISCELLANEOUS ITEMS OF EQUIPMENT AND MATERIALS (E.G. BOLTS, NUTS, WIRE, CLOTH).
MAKE CERTAIN THAT ALL ITEMS WHICH COULD BE INGESTED ARE REMOVED BEFORE STARTING APU.

CAUTION : MAKE CERTAIN THAT CLEANING AGENT IS COMPLETELY REMOVED BEFORE INSTALLATION OF BLEED AIR DUCT ELBOW.

CAUTION : MAKE CERTAIN THAT ALL APERTURES, DISCONNECTED LINES AND CONNECTORS ARE COVERED, USE ONLY PLASTIC BLANKING PLUGS, CAPS OR COVERS.
DO NOT USE EXCESSIVE QUANTITIES OF CLEANING AGENT, ESPECIALLY ON ELECTRICAL EQUIPMENT.

1. General Cleaning of APU and APU Compartment

A. Equipment and Materials

ITEM	DESIGNATION
(1) Access Platform, 6 m (20 ft.)	
(2) Drip Tray	
(3) Fiber-Bristled Brush	
(4) Soft, Clean, Lint-Free Cloth	
(5) Circuit Breaker Safety Clips and Tags	
(6) Protective Gloves and Goggles	
(7) Dry, Filtered, Compressed Air	Maximum 20 psig (1.4 bar)
(8) Potable Water	
(9)MIL-C-6529, Type III	Corrosion-Preventive Compound
10)Material No. 05-027	Special Materials (Ref. 20-31-00)
11)Material No. 10-002	Anti-Icing and De-Icing Materials (Ref. 20-31-00)
12)Material No. 11-001	Cleaning Agents (Ref. 20-31-00)
13)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
14)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
15)Material No. 18-005	Cleaning Agents (Ref. 20-31-00)

Referenced Procedure
- 51-75-10, P. Block 801 Repair of Paint Coatings

B. Procedure
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACKUP/SUPPLY	58KD	B52
131VU	APU/ECB BACKUP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform.
(c)Open access doors 315AL and 316AR.
(d)Position drip tray, beneath cleaning area.

(2)General Cleaning of APU

CAUTION : DO NOT USE EXCESSIVE QUANTITIES OF CLEANING AGENT, ESPECIALLY ON ELECTRICAL COMPONENTS.

(a)Rough cleaning of APU.

1 Clean APU by wiping with clean, lint-free cloth.

NOTE : For thorough cleaning of APU carry out following paras. (b) to (d).

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(b)For thorough cleaning of metallic parts apply cleaning agent (Mat. No. 11-002) using soft, lint-free cloth and fiber bristled brush.

1 Clean painted areas thoroughly, but do not remove paint if still serviceable.

2 Remove carbon residues and combustion products as well as crusts which could become loose and cause damage.

NOTE : Heat discoloration of metal surface is not objectionable.

WARNING : CLEANING AGENTS MAT. NO. 11-003 IS DANGEROUS.

3 Make certain that flange areas, spigots and sealing surfaces are free of oil, gasket residue and sealant before installation. Use cleaning agent (Mat. No. 11-003) and fiber bristled brush for removal of adhering gaskets or sealants.

4 Remove remaining cleaning agent with clean, lint-free cloth.

5 To prevent corrosion apply corrosion-preventive compound (MIL-C-6529, Type III) to steel and 400 series stainless steel parts after cleaning.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.

(c)Clean rubber and other non-metallic parts with fiber bristled brush, dipped into cleaning agent (Mat. No. 11-005).

1 Remove remaining cleaning agent, using clean, lint-free cloth.

(d)Clean electrical components, connectors and harnesses using clean, lint-free cloth and fiber bristled brush, dipped into anti-icing and de-icing material (Mat. No. 10-002).

1 Remove remaining anti-icing and de-icing material with clean, lint-free cloth and dry, filtered, compressed air of maximum 20 psig (1.4 bar).

(3)General Cleaning of APU Compartment
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.
(a)Clean APU Compartment using cleaning agent (Mat. No. 11-001).
1 Rinse with potable water.
(b)Dry APU compartment using dry, filtered, compressed air of maximum 20 psig (1.4 bar).
(c)Check coating in following areas and apply moisture removing oil (Mat. No. 05-027) if necessary (Ref. 51-75-10, P. Block 801):
- fire detection loop attachments
- APU suspension structural brackets and shock mounts
- bleed air duct tie-rod attachments
- air inlet duct tie-rod attachments
- bolt of exhaust coupling clamp
- access door hinges.

(4)Close-Up
(a)Remove drip tray.
(b)Make certain working area is clean and clear of tools and miscellaneous items of equipment.
(c)Close access doors 315AL and 316AR.
(d)Remove access platform.
(e)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.

2. Compressor and Air Intake Cleaning

A. Compressor Cleaning
NOTE : It should be understood that this procedure is not a 'cure-all' for APU problems. Proper evaluation, to ensure that other sources such as control system malfunctions are not creating problems and that the APU compressor section is in fact contaminated, is necessary to establish the need for cleaning. The final decision to clean the compressor is generally made by engineering personal. Judicious cleaning of the compressor section can be effective in reducing high EGT caused by compressor contamination. However, a time period between the wash cyles is to be established by the individual operator's experience about the extent of compressor contamination and effectiveness of the following procedure.

(1)Reason for the Job
(a)High EGT caused by compressor contamination.

(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform, 6 m (20 ft.)
(b)	Circuit Breaker Safety Clips and Tags
(c)	Blanking Caps and Plugs
(d)	Demineralized Water (maximum hardness factor of 300 ppm CaCO3)
(e)	Soft-Bristle Brush, Fiber or Aluminum
(f)	Soft, Clean, Lint-Free Cloth
(g)	Protective Gloves and Goggles
(h)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(j)	Tie-Straps
(k)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
(l)	Dry, Filtered Compressed Air Maximum 20 psig (1.4 bar)
(m)98A49007625000	Device - Cleaning, APU
(n)A4907015200000	APU Substitution Kit
(p)Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
(q)Material No. 11-012	Cleaning Agents (Ref. 20-31-00)
(r)Material No. 11-013	Cleaning Agents (Ref. 20-31-00)
or	
Material No. 11-014	Cleaning Agents (Ref. 20-31-00)
Referenced Procedures	
- 20-28-11, P. Block 1	Electrical Bonding
- 23-44-00, P. Block 1	Cabin and Service Interphone
- 24-41-00, P. Block 301	AC External Power Control
- 49-10-00, P. Block 501	Power Plant
- 49-16-14, P. Block 401	Inlet Duct
- 55-00-00, P. Block 301	Stabilizers - Standard Warnings and Procedures

(3)Procedure

(a)Job Set-Up

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

1 Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACKUP/SUPPLY	58KD	B52
131VU	APU/ECB BACKUP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

2 Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

3 Make certain, that electronics racks ventilation is correct.

4 Make horizontal stabilizer safe (Ref. 55-00-00, P. Block 301).

5 Position access platform.

6 Open access doors 315AL and 316AR.

7 Remove inlet duct (Ref. 49-16-14, P. Block 401).

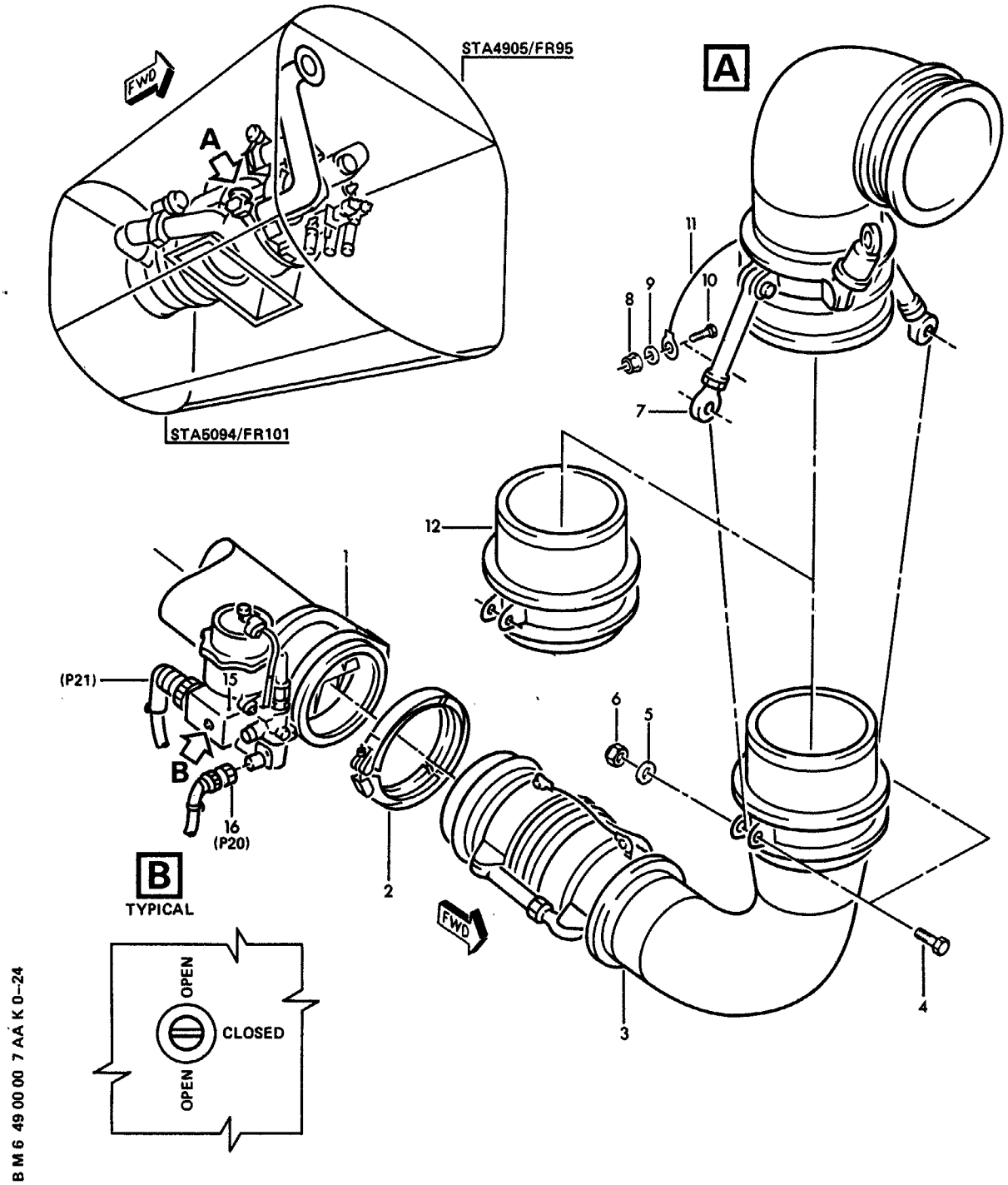
8 Connect service interphone (Ref. 23-44-00, P. Block 1).

(b)Remove bleed air duct elbow.
(Ref. Fig. 701)
1 Remove nut (8), washer (9), screw (10) and disconnect bonding strap (11).
2 Support bleed air duct elbow (3) and remove clamp (2).
3 Remove nuts (6), washers (5) and bolts (4), disconnect tie-rods (7) and remove bleed air duct elbow (3).
4 Install bleed air cover P/N A4907016100600 (part of APU substitution kit).
5 Position bleed air cover (12) and connect tie-rods (7).
6 Install bolts (4), washers (5) and nuts (6).
NOTE : Do not cover the flange of the APU bleed load valve.

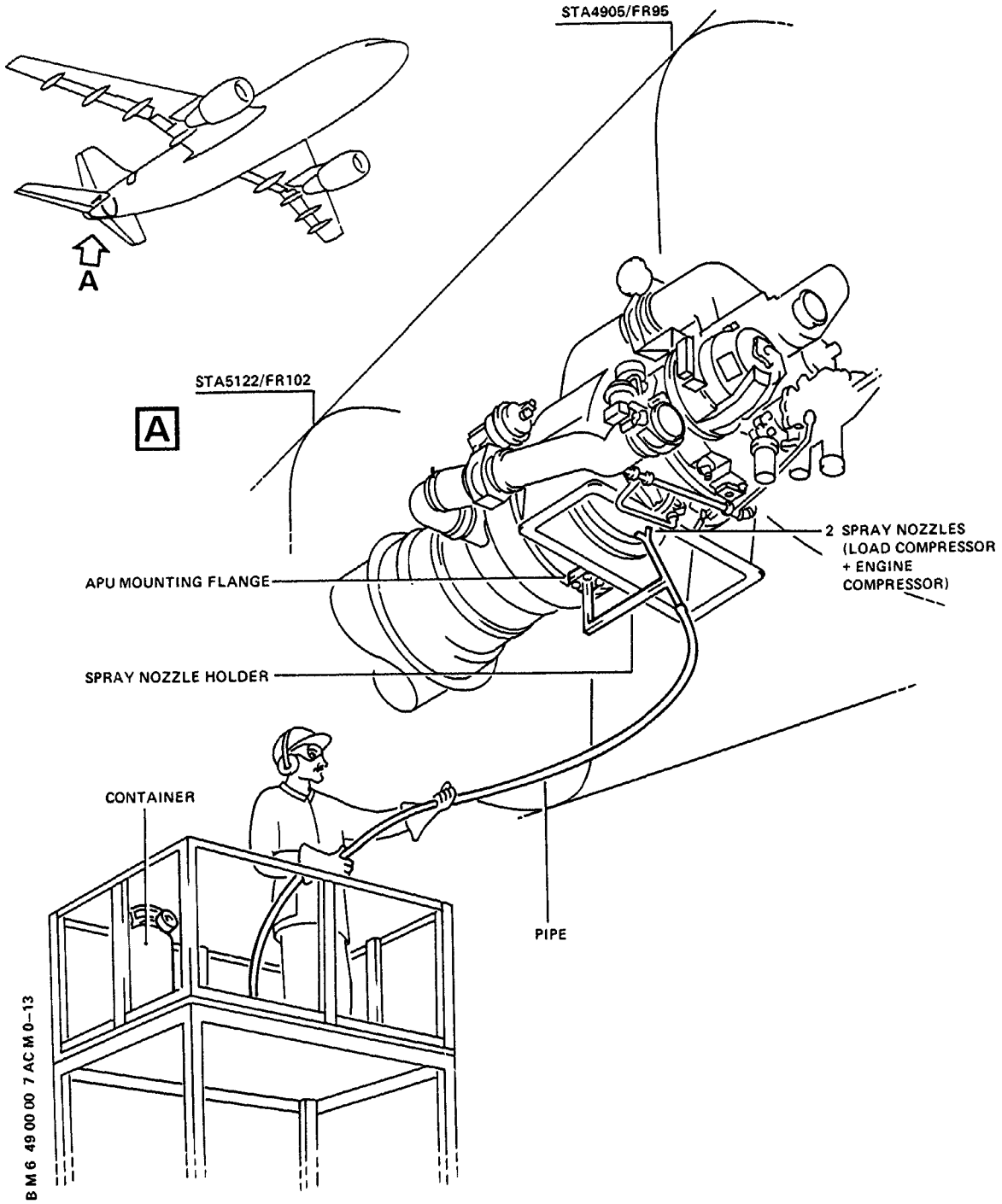
(c)De-activate APU bleed load valve.
(Ref. Fig. 701)
1 Remove lockwire and disconnect connector P20 (16) from solenoid valve.
CAUTION : MAKE CERTAIN THAT ALL APERTURES, DISCONNECTED LINES AND CONNECTORS ARE COVERED, USE ONLY PLASTIC BLANKING PLUGS, CAPS OR COVERS. DO NOT USE EXCESSIVE QUANTITES OF CLEANING AGENT, ESPECIALLY ON ELECTRICAL EQUIPMENT.
2 Install blanking caps to disconnected connectors and secure connector P20 (16) to harness of connector P21 using tie-straps.
NOTE : Check that visual position indicator of bleed load valve indicates that valve is in CLOSED position.
Do not disconnect electrical connector P21 from bleed load valve position switch.
3 Install spray nozzles at APU plenum inlet.
(Ref. Fig. 702)
4 Adjust spray nozzles, so that one nozzle will spray into the engine compressor and one into the load compressor.
NOTE : Permanent installation during cleaning process is acceptable.

(d)Prepare cleaning fluid.
NOTE : Required quantity of cleaning fluid is 18 l (4.75 US gal.). However capacity of cleaning device is 9 l (2.38 US gal.).
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.
1 Mix demineralized water and cleaning agent (Mat. No 11-013 or Mat. No. 11-014) to obtain cleaning fluid, made up of one-part of cleaning agent (Mat. No. 11-013 or Mat. No. 11-014) and two-parts of demineralized water.

(e)Prepare pressurized container.
1 Fill cleaning device container with 9 l (2.38 US gal.) of prepared cleaning fluid.
2 Seal container.
3 Obtain a pressure of approx. 5 bar (72.50 psig) by operating hand pump.



Bleed Air Duct Elbow and Bleed Load Valve
Figure 701



Compressor Cleaning
Figure 702

(f)Clean APU compressors.
(Ref. Fig. 702)

1 Remove safety clips, tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.

WARNING : MAKE CERTAIN THAT THE A/C'S NOSE FACES INTO WIND.
BEWARE OF VAPOURIZED CLEANING FLUID, BLOWN OUT OF COOLING FAN AND BLEED LOAD VALVE.

CAUTION : CHECK ACCESS PLATFORM AND APU COMPARTMENT FOR MISCELLANEOUS ITEMS OF EQUIPMENT AND MATERIALS (E.G. BOLTS, NUTS, WIRE, CLOTH).
MAKE CERTAIN THAT ALL ITEMS WHICH COULD BE INGESTED ARE REMOVED BEFORE STARTING APU.
MAKE CERTAIN NOT TO EXCEED MAX. EGT LIMITS (REF. 49-10-00, P. Block 501).

2 Start and operate APU with no load (Ref. 49-10-00, P. Block 501).

3 Record the following data before cleaning the APU compressors:
EGT _____ deg. C.
OAT _____ deg. C.

4 On AIR BLEED panel 436VU, place APU BLEED switch to ON position.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.

5 Spray cleaning fluid into the APU compressors.

NOTE : Operate hand pump, while spraying cleaning fluid into the APU compressors, to maintain pressure in pressurized container at approx. 5 bar (72.50 psig).

6 Run APU with no cleaning fluid for two minutes.

WARNING : MAKE CERTAIN, THAT PRESSURIZED CONTAINER IS COMPLETELY DEPRESSURIZED BEFORE OPENING.

7 Prepare pressurized container for second cleaning (refer to step (e)).

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.

8 Spray cleaning fluid into the APU compressors.

NOTE : Operate hand pump, while spraying cleaning fluid into the APU compressors, to maintain pressurized container at approx. 5 bar (72.50 psig).

9 Operate APU for 10 minutes for thorough drying of bleed ducting.

10 On AIR BLEED panel 436VU, place APU BLEED switch to OFF position.

11 Record the following data:

EGT _____ deg. C.

OAT _____ deg. C.

12 Shut down APU (Ref. 49-10-00, P. Block 501).

(g) Compare pre - and post - wash performance.

1 Check for and assess any improvement.

2 If unsatisfactory, repeat cleaning procedure and evalute performance improvement.

(h) Prepare APU for service.

1 Open, safety and tag the following circuit breakers: 50KA, 1KD, 2KD, 58KD and 71KD.

2 Remove spray nozzles from APU plenum.

(j) Re-activate APU bleed load valve.

(Ref. Fig. 701)

1 Clean APU bleed load valve.

2 Remove blanking caps from connectors.
Connect electrical connector P20 (16) and safety with lockwire.

(k) Install bleed air duct elbow.

(Ref. Fig. 701)

1 Support bleed air cover (12) and remove nuts (6), washers (5) and bolts (4).

3 Make certain that bleed air duct elbow and connection flanges are clean and free of oil and grease.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.

4 If necessary clean bleed air duct elbow and connection flanges, using clean, lint-free cloth and cleaning agent (Mat. No. 11-003).

CAUTION : MAKE CERTAIN THAT CLEANING AGENT IS COMPLETELY REMOVED BEFORE INSTALLATION OF BLEED AIR DUCT ELBOW.

5 Position and support bleed air duct elbow (3).

6 Connect tie-rods (7) and install bolts (4), washers (5) and nuts (6).

7 Align bleed air duct elbow (3) with bleed load valve (1).

8 Install clamp (2).

NOTE : Make certain that bleed air duct (3) is installed without tension.

9 Connect bonding strap (11) with screw (10), washer (9) and nut (8).
For electrical bonding refer to 20-28-11, P. Block 1.

B. Air Intake Cleaning.

(Ref. Fig. 703)

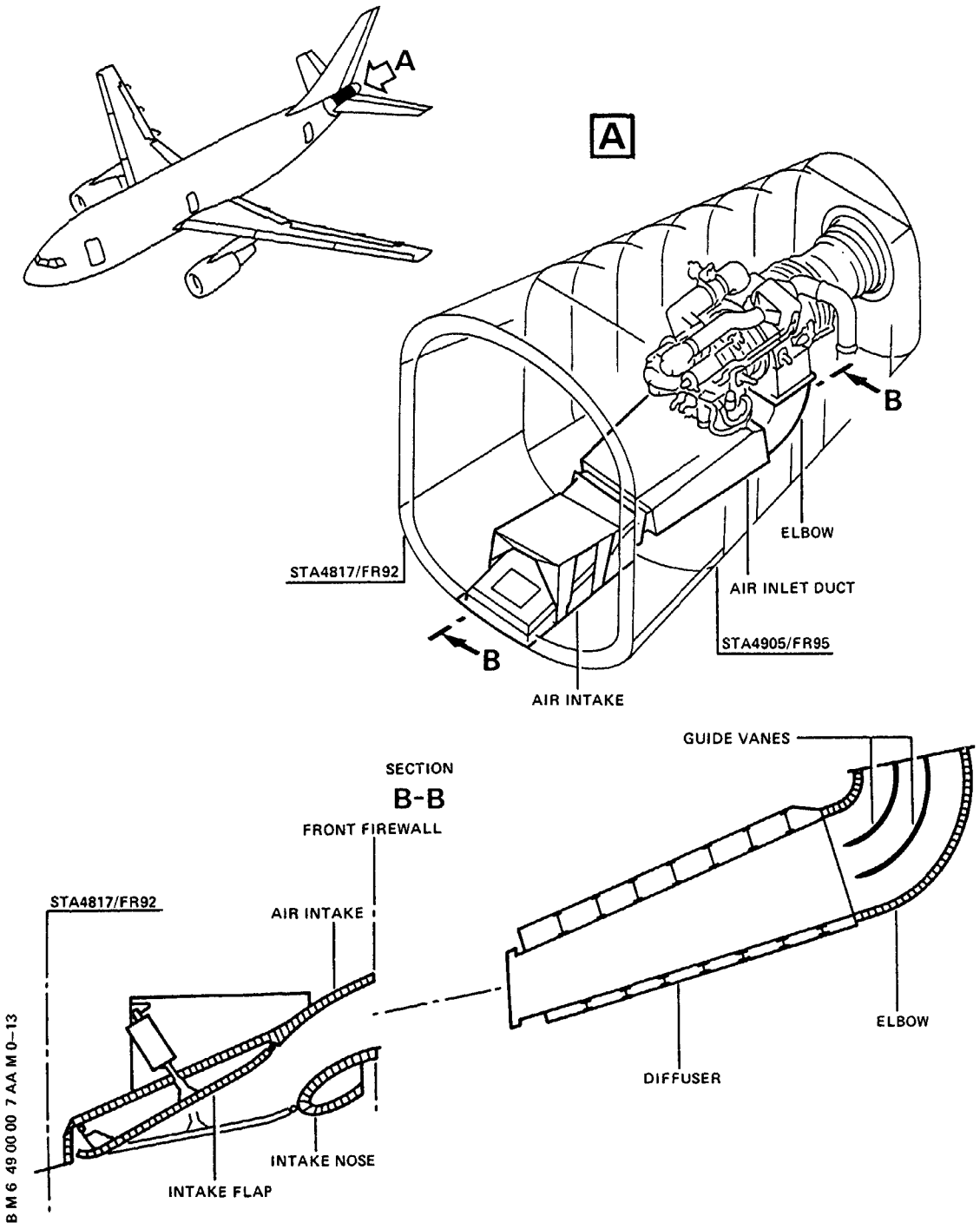
(1) Open, safety and tag circuit breakers: 50KA, 1KD, 2KD, 58KD and 71KD.

(2) Clean interior of air intake duct, diffuser, elbow and guide vanes with cleaning agent (Mat. No. 11-012) using soft-bristle brush.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS.

(3) Clean air intake, as required, with cleaning agent (Mat. No. 11-012) using soft-bristle brush.

(4) Dry air intake and inlet duct with dry, filtered compressed air of maximum 20 psig (1.4 bar).



Air Intake Cleaning
Figure 703

C. Close-Up

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

(1)Install inlet duct (Ref. 49-16-14, P. Block 401).
(2)Make certain that APU compartment is clear of tools and miscellaneous items of equipment.
(3)Clean APU compartment, refer to para. 1. B.(3).
(4)Close access doors 315AL and 316AR.
(5)Disconnect service interphone (Ref. 23-44-00, P. Block 1).
(6)Remove access platform.
(7)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.
(8)Return stabilizers to operating condition (Ref. 55-00-00, P. Block 301).
(9)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

1. General
The Auxiliary Power Unit (APU) is installed in the fuselage tailcone, aft of FR95. It is suspended by a three-point, shock-mounted, supension system within a fireproof compartment. Provisions are made for hoisting or lowering the engine/gearbox unit, complete with accesories, through a pair of outwardhinged doors on the underside of the fuselage.
(Ref. Fig. 001, 002)

2. Description
The power plant consists of the following:

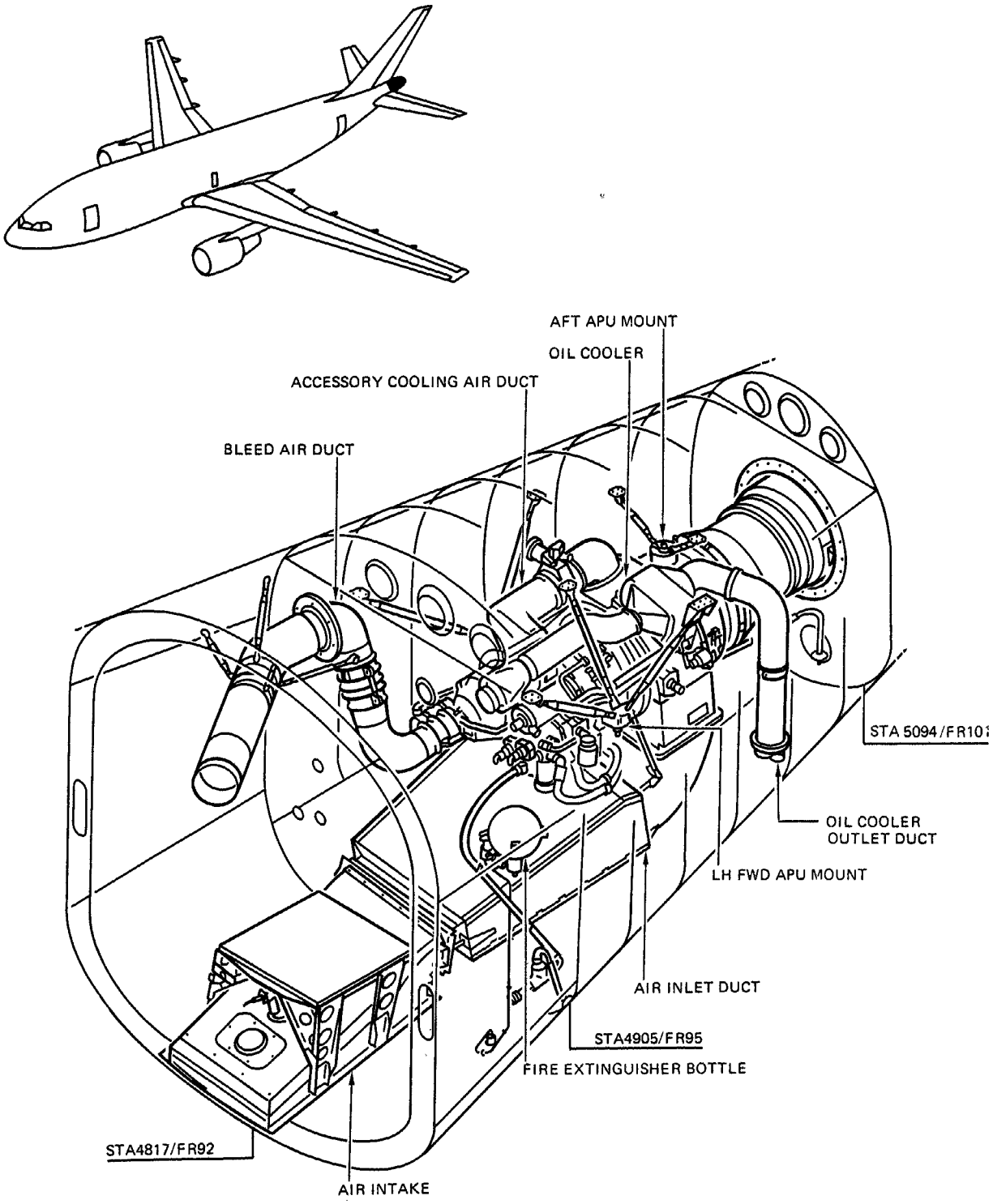
A. APU Mounts (Ref. 49-12-00)
The APU suspended at three points by tie-rods. In order to protect the structure and the APU against vibration. Shock mounts are provided between the tie-rods and the APU. The three APU mounts are attached to the APU compartment at FR95, FR98 and FR99.
The mounts are attached to APU with brackets.

B. Fire Seal (Ref. 49-13-00)
The APU compartment is designed as a fireproof box with a front FR95 and a rear FR101 fire wall. The rear fire wall is provided with a fire seal around the exhaust muffler.

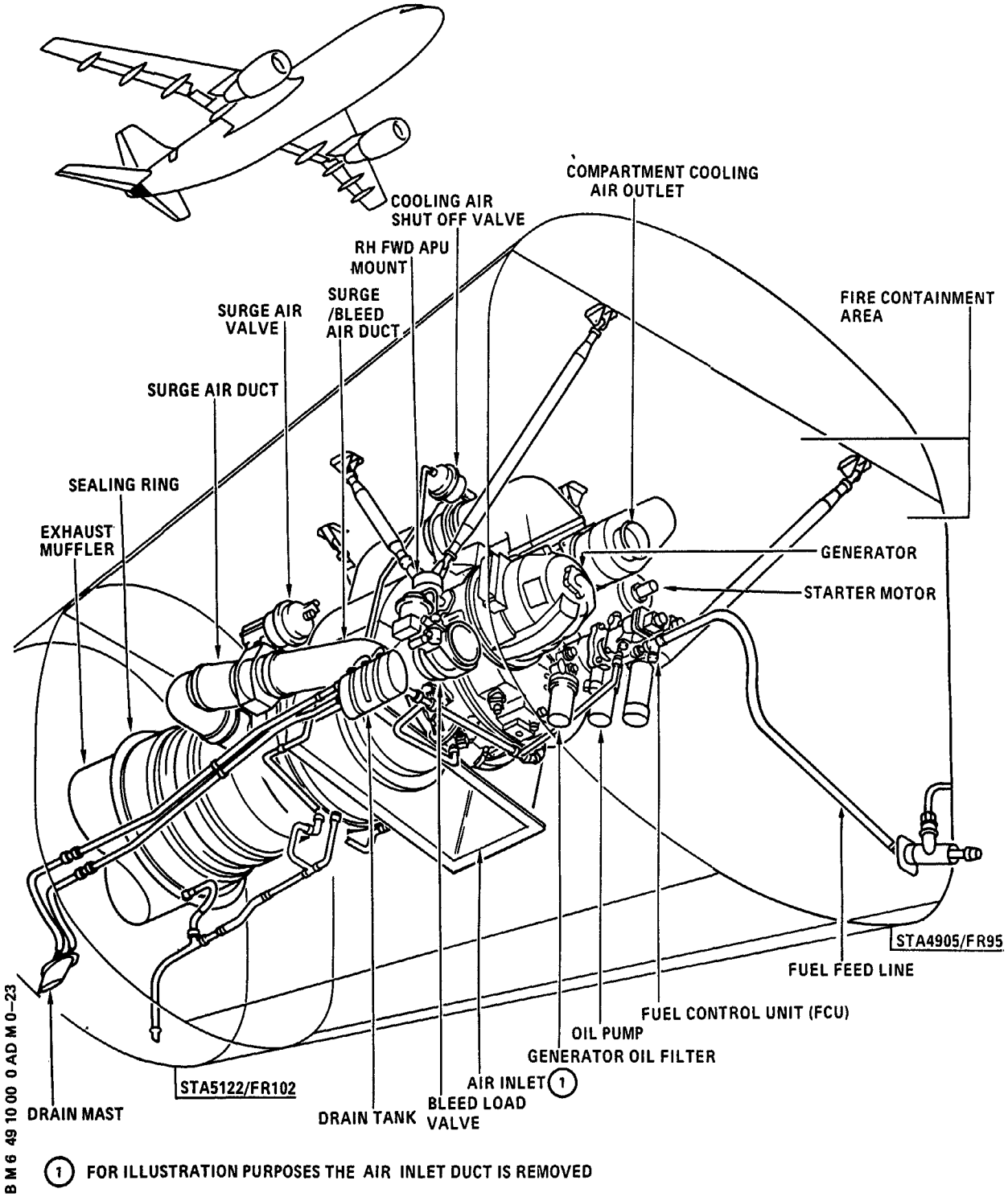
C. Air Intake System (Ref. 49-16-00)
The air intake system directs ambient air to the APU plenum chamber. The system includes the air intake, an inlet flap at the bottom of the fuselage in the front of FR92 an air inlet duct consisting of a diffuser and an elbow between FR92 and APU plenum chamber.

D. Drain System (Ref. 49-17-00)
A drain system is installed on the APU where it is necessary to evacuate fuel, oil, water and air. It prevents the, possibly harmfull, accumulation of liquids in the APU bay. Water/fuel drains are run directly to the atmosphere. Fuel, oil and air drains are routed to the drain tank. The drain tank is exhausted by a suction line through the external drain mast wich operates in flight, at speeds above 200 kt. The drain system is constructed of fully fireproofed components.

3. Operation
APU operation is described in 49-00-00, P. Block 1 while start, run and shutdown produres are covered in 49-00-00, P. Block 501 and 49-10-00, P. Block 501.



Power Plant Installation - LH Side
Figure 001



Power Plant Installation - RH Side
Figure 002

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

WARNING : MAKE CERTAIN THAT THE CABLE IS NOT KINKED OR TWISTED. KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

WARNING : WHEN LOWERING THE APU, MAKE SURE THAT THE TRANSPORTATION TROLLEY IS IN THE CORRECT POSITION. LOWER DIRECTLY INTO POSITION ON TO THE TROLLEY. DO NOT TRY TO FORCE THE APU ON TO THE TROLLEY.

WARNING : MAKE SURE THAT THE APU IS DIRECTLY BELOW THE INSTALLATION POINT BEFORE LIFTING THE APU INTO POSITION.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENTS. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. AVOID INHALATION OF FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

CAUTION : IF APU AC GENERATOR IS NOT INSTALLED, APU WILL NOT BE IN BALANCE WHEN REMOVED FROM MOUNTS. TO AVOID UNBALANCE, SUPPORT APU AS NECESSARY.

CAUTION : MAKE CERTAIN THAT SUPPLY CONNECTION POSITIVE 8 KA(+) IS CONNECTED TO STARTER MOTOR TERMINAL PRIOR TO RESISTOR ASSEMBLY.

CAUTION : WASHERS MUST BE INSTALLED BETWEEN THE TERMINAL NUTS AND PHASE LEADS. DO NOT INSTALL ANY WASHERS UNDER PHASE LEADS. LOCALIZED RESISTANCE HEATING AND BURNING OF THE TERMINAL BLOCK WILL RESULT.

CAUTION : MAKE CERTAIN THAT BLEED AIR COVER P/N A4907016100600 IS INSTALLED.

CAUTION : MAKE CERTAIN THAT CLEANING AGENT IS COMPLETELY REMOVED BEFORE INSTALLATION OF BLEED AIR DUCT ELBOW.

A. Equipment and Materials

ITEM	DESIGNATION
1.	Access Platform, 6 m (20 ft.)
2.	Container, 2 l (0.50 US gal.) Capacity
3.	Blanking Caps and Plugs
4.	Protective Covers
5.	Tie-straps
6.	Circuit Breaker Safety Clips and Tags
7.	Torque Wrench, 0-100 lbf.in. (0-1 m.daN)
8.	Torque Wrench, 100-200 lbf.in. (1-2 m.daN)

ITEM		DESIGNATION
9.		Torque Wrench, 200-450 lbf.in. (2-5 m.daN)
10.		Torque Wrench, 450-1000 lbf.in. (5-11 m.daN)
11.	98A28007570000	Adapter - Vent and Drain Valve, APU
12.	91/541	Hoist - Minilift
13.	98A49107504001	Protector - Thread, APU Mounting Bolts
14.	98A49207605000	Trolley - Assembly and Transport, APU
15.	A4907015200051	Flight without APU Kit (Ref. IPC)
16.	A4907016100600	Bleed Air Cover (Ref. IPC)
17.		Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
18.		O-Rings
19.	Material No. 04-012	Common Greases (Ref. 20-31-00)
20.	Material No. 05-027	Special Materials (Ref. 20-31-00)
21.	Material No. 06-001A	Lubricants (Ref. 20-31-00)
22.	Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
23.	Material No. 11-012	Cleaning Agents (Ref. 20-31-00)
Referenced Procedures		
- 20-28-11, P. Block 1		Electrical Bonding
- 21-51-00, P. Block 301		Air Cooling System
- 21-51-16, P. Block 301		Water-Separator
- 24-23-11, P. Block 401		APU AC Generator (8XS)
- 49-00-00, P. Block 501		Airborne Auxiliary Power
- 49-00-00, P. Block 701		Airborne Auxiliary Power
- 49-10-00, P. Block 801		Power Plant
- 49-12-00, P. Block 601		APU Mounts
- 49-12-14, P. Block 401		APU Mount Brackets
- 49-16-14, P. Block 401		Inlet Duct
- 49-17-11, P. Block 401		Drain Tank
- 49-17-15, P. Block 201		Hose-Turbine Plenum and Exhaust Drain
- 49-32-11, P. Block 401		Fuel Control Unit
- 49-52-14, P. Block 401		Oil Cooler Outlet Duct
- 49-81-15, P. Block 401		Exhaust Muffler and Sealing Ring
- 49-90-00, P. Block 301		Oil
- 51-75-10, P. Block 801		Repair of Paint Coatings
- 52-41-21, P. Block 401		APU Access Doors
- 55-00-00, P. Block 301		Stabilizers - Standard Warnings and Procedures

B. Procedure

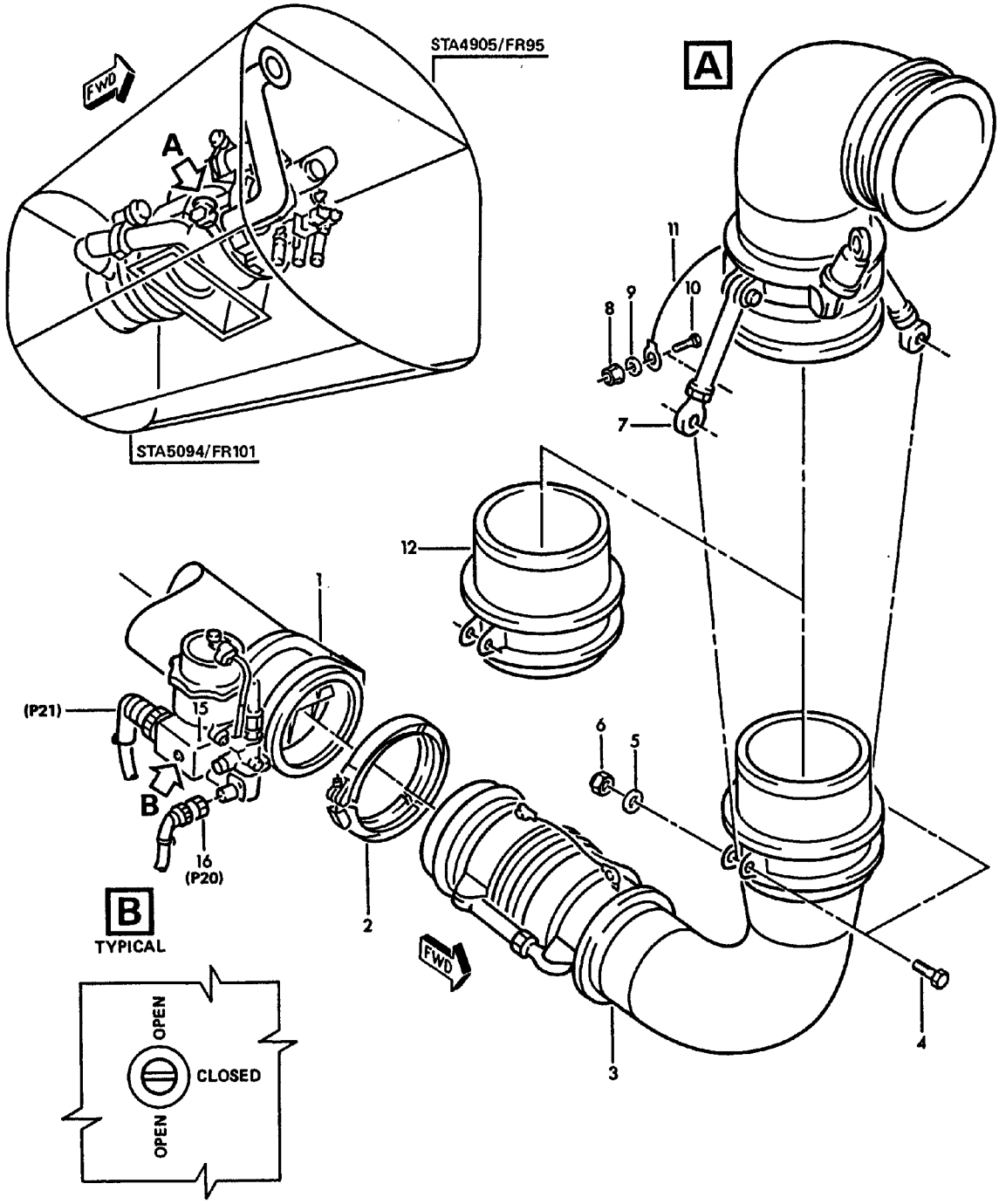
(1) Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL PUMP/SUPPLY	1QC	A53
131VU	APU/IND OIL QTY	1KK	A54
131VU	APU/IND N	1KN	A55
131VU	APU/IND EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB B	2WF	A61
131VU	APU/FUEL LP VALVE/CTL	4WF	A62
131VU	APU/FUEL LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP A	1WG	B59
131VU	APU/FIRE EXTING/AUTO EXTING GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB A	1WF	B61
131VU	APU/FUEL ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/APU BLEED VALVE/CTL + WARN	4HV	G55
133VU	ELEC/APU GEN GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN GCU/WARN	5XS	U84

(b)Make horizontal stabilizer safe (Ref. 55-00-00, P. Block 301).
(c)Position access platform and open access doors 315AL and 316AR.
NOTE : Removal of access doors 315AL and 316AR (Ref. 52-41-21, P. Block 401) avoids obstruction of working area on access platform.

(2) Removal
NOTE : Install blanking caps and plugs or protective covers to disconnected ducts, lines and electrical connectors.
(a)Remove inlet duct (Ref. 49-16-14, P. Block 401).
(b)Release exhaust coupling (11) to disconnect exhaust muffler sealing ring coupling (Ref. Fig. 404).
1 Push guide ring rearwards into the sealing ring coupling until a finger-wide gap is made between turbine heat shield flange and guide ring flange.
2 Remove coupling (11).
(c)Remove bleed air duct elbow.
(Ref. Fig. 401)
1 Remove nut (8), washer (9) and screw (10) to disconnect bonding strap (11).
2 Support bleed air duct elbow (3) and remove clamp (2).
3 Remove nuts (6), washers (5) and bolts (4), disconnect tie-rods (7) and remove bleed air duct elbow (3).



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Bleed Air Duct Elbow and Bleed Load Valve
Figure 401

4 Install bleed air cover P/NA4907016100600 (part of APU substitution kit).
- Position bleed air cover (12) and connect tie-rods (7).
- Install bolts (4), washers (5) and nuts (6).

(d)Disconnect electrical connections.
(Ref. Fig. 402, 403)

1 Cut and remove lockwire and disconnect electrical plugs P2 and P3 (1) from sockets 6032VC and 6033VC. Remove clamps, supporting harness to structure. To prevent damage, secure harness ends carefully to APU.
2 Cut and remove lockwire and disconnect generator control connector (2) 8XS-A.
3 Cut and remove lockwire, and remove bolts (8), washers (7) and cover (6).
4 Remove nuts (5), washers (4) and disconnect generator connections (3) 8XS T1 thru T3 and N.

** FOR STARTER MOTOR 519858 -3,-4,-5,-6 and subsequent (Ref. Fig. 403)

5 Remove and retain nuts (1, 2), washers (3, 4) and disconnect starter motor electrical connections negative 8KA(-) (7), resistor assembly (5) and positive 8KA(+) (6).
1 Secure resistor assembly (5) to starter motor.
6 To prevent damage, attach generator and starter harness ends to FR95.

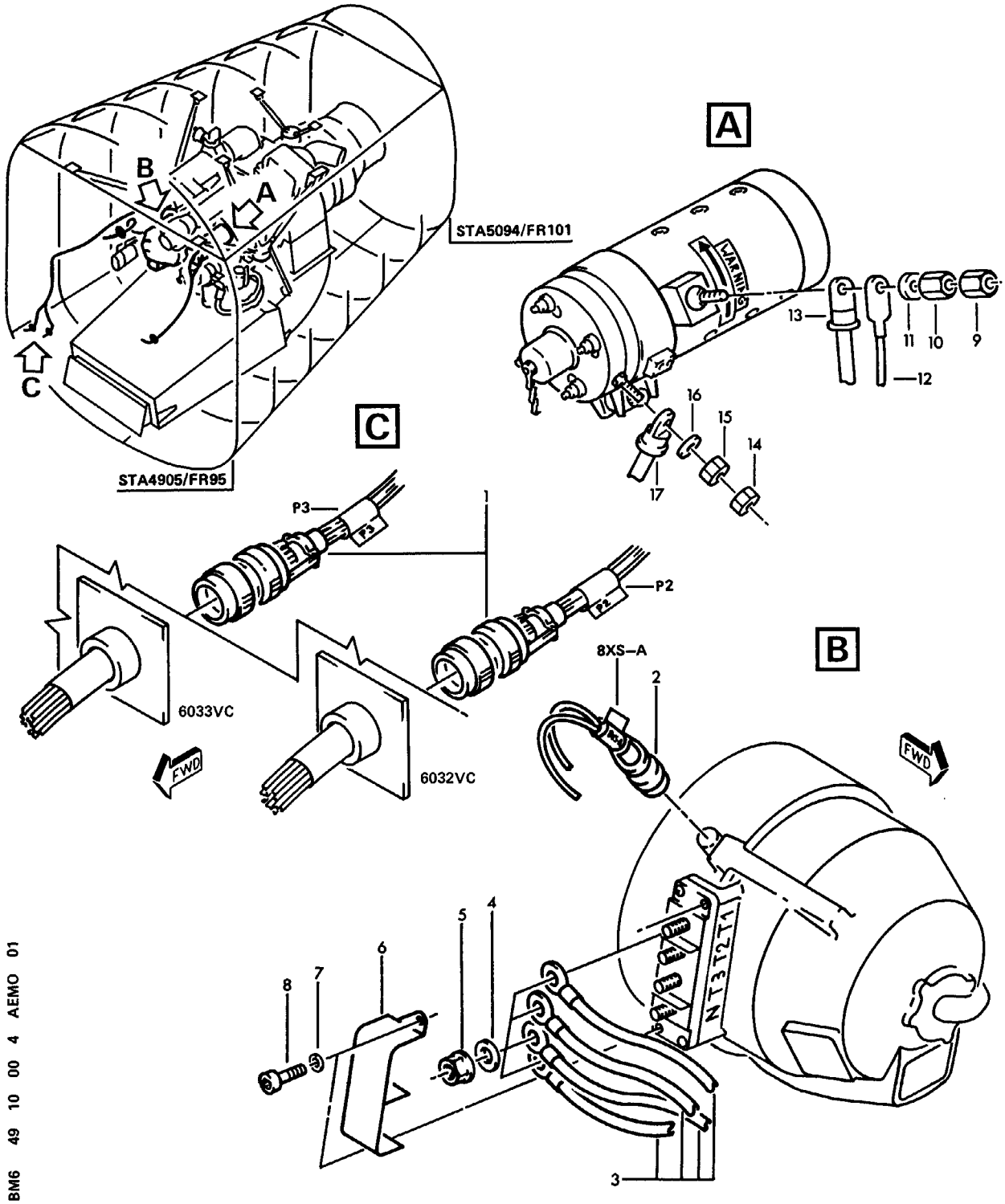
(e)Disconnect fuel feed line (Ref. Fig. 404).

1 Position container, 2 l (0.50 US gal.) capacity, below fuel feed line vent and drain valve port (2).
2 Carry out draining of fuel feed line using vent and drain valve adapter (Ref. 49-32-11, P. Block 401).
3 Cut and remove lockwire.
4 Release nut (3) and then disconnect fuel feed line (1) by removing fitting (4).
1 Discard O-ring (5).

5 To prevent damage, stow fuel feed line in appropriate bracket on FR95.
6 Remove container.

(f)Disconnect drain lines (Ref. Fig. 404).

1 Position 2 l (0.50 US gal.) capacity container below drain tank.
2 Cut and remove lockwire, remove drain plug (6) and allow liquid to drain.
3 Discard drain plug O-ring.
4 Install new O-ring onto drain plug (6).
5 Install drain plug (6).
6 Safety drain plug (6) with lockwire.
7 Disconnect drain hoses from collector drain line (10) and fuel flow divider drain line (7).
8 Disconnect and remove heat shield drain line (8) and turbine plenum



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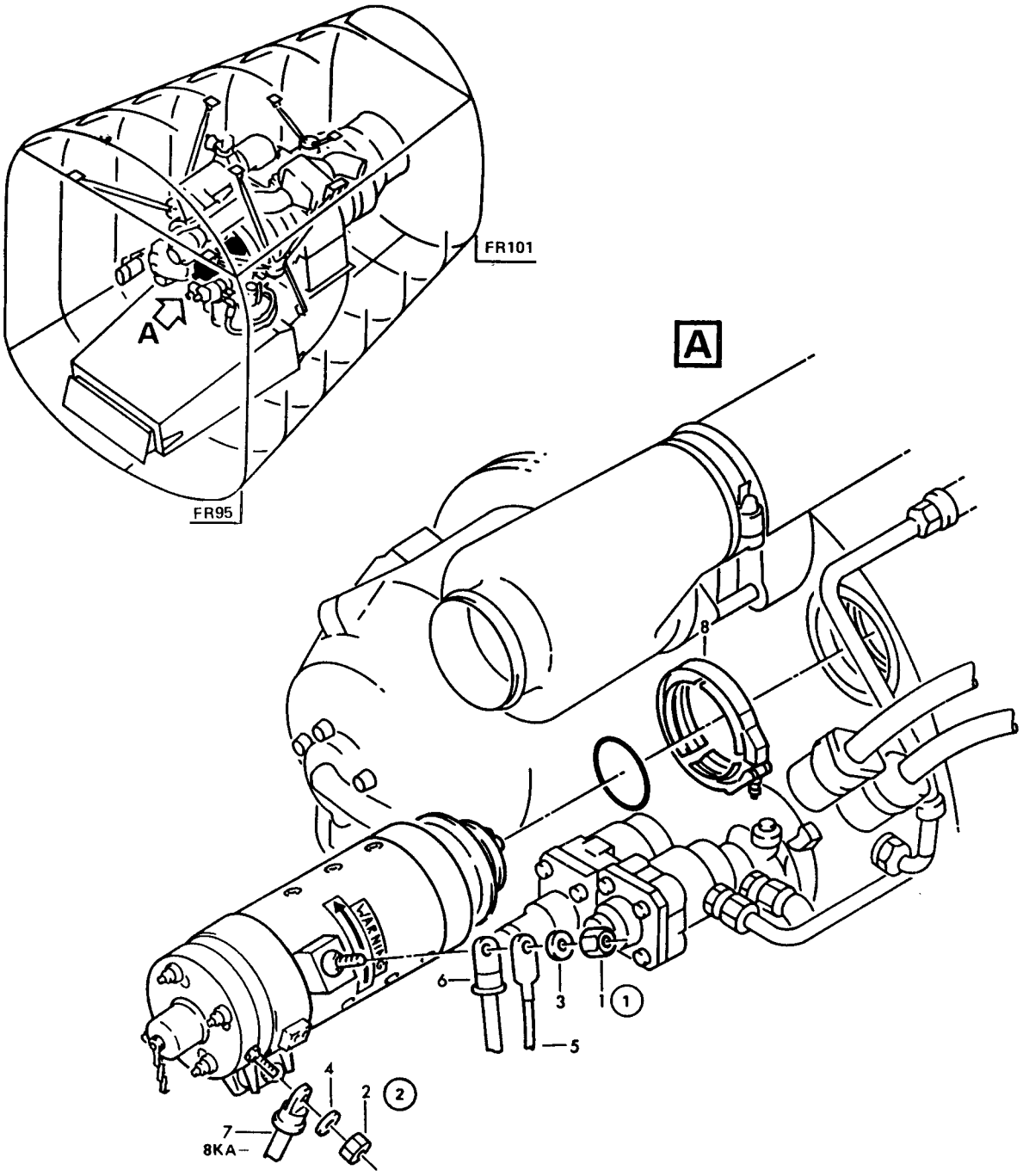
Electrical Connections
Figure 402



(1) TORQUE TO BETWEEN 75 AND 80 lbf.in. (0.85 AND 0.90m.daN)

(2) TORQUE TO BETWEEN 50 AND 55 lbf. in. (0.56 AND 0.62 m. daN)

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Electrical Connections
Figure 403

R

drain line (9) as an assembly.
(g)Remove oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
(h)Remove APU mounts bonding straps. (Ref. Fig. 405).

1 Remove nuts (14), bolts (12), washers (13) and bonding straps (10) from bonding brackets (11) on tie-rods.
2 To prevent damage, fix bonding straps (10) to APU mount brackets.

(Ref. Fig. 404)

(Ref. Fig. 405)

(i)Install Hoist
WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

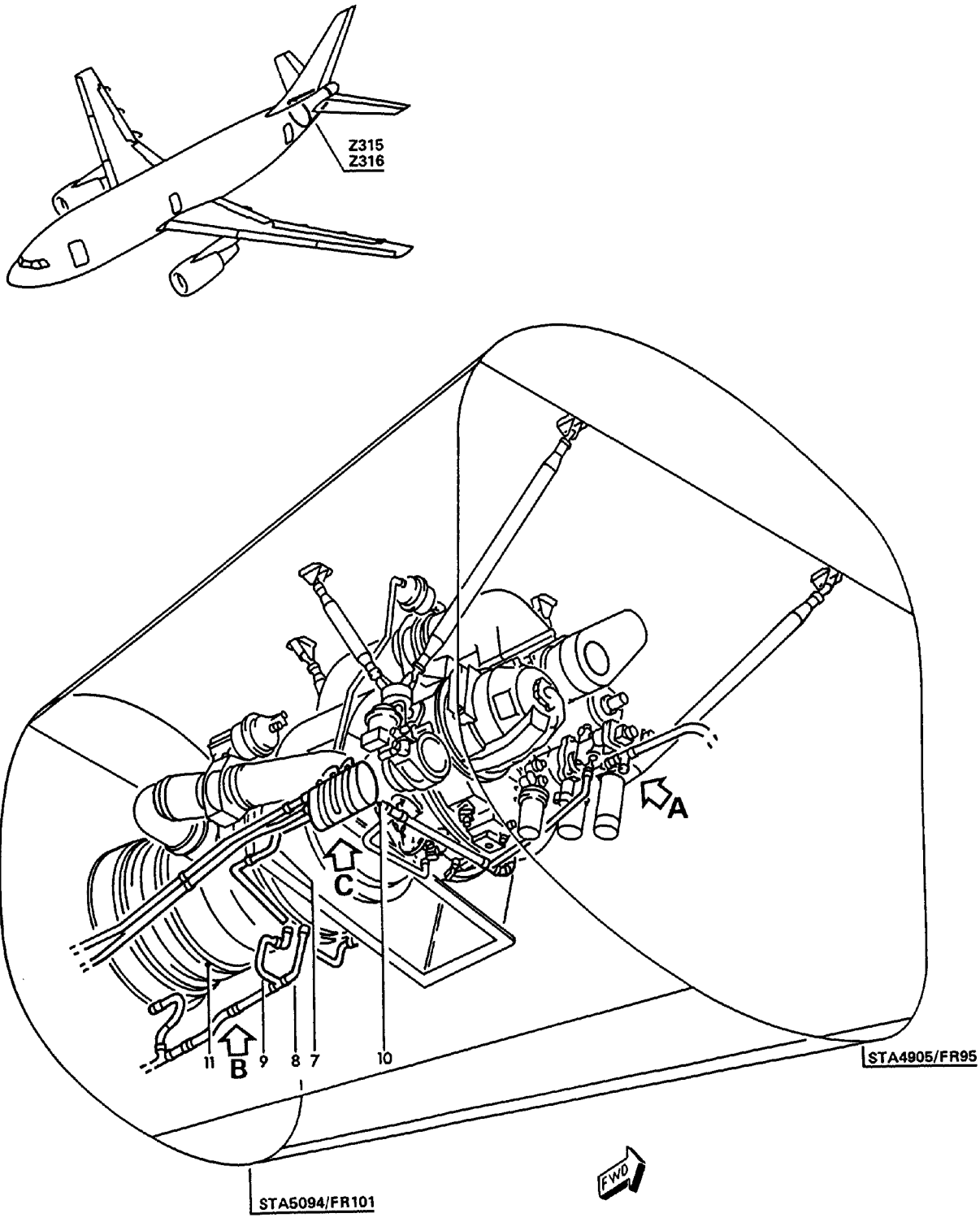
1 Use hoist P/N 91/541 (Ref. Fig. 406)

- Connect suspension (3) of hoist (1) to APU compartment hoist bracket (2) by installing pip pin (4).
- Adjust and connect bracket (6) of hoist (1) to sidewall attaching point (5) by installing pip pin (7).
- Position spreader bar (11) onto forward (13) and aft (14) APU hoist brackets and install pip pins (12).
- Connect shackle adaptor (8) to spreader bar (11) with shackle pin (9).
- Secure shackle adaptor (9) with retaining pin (10).

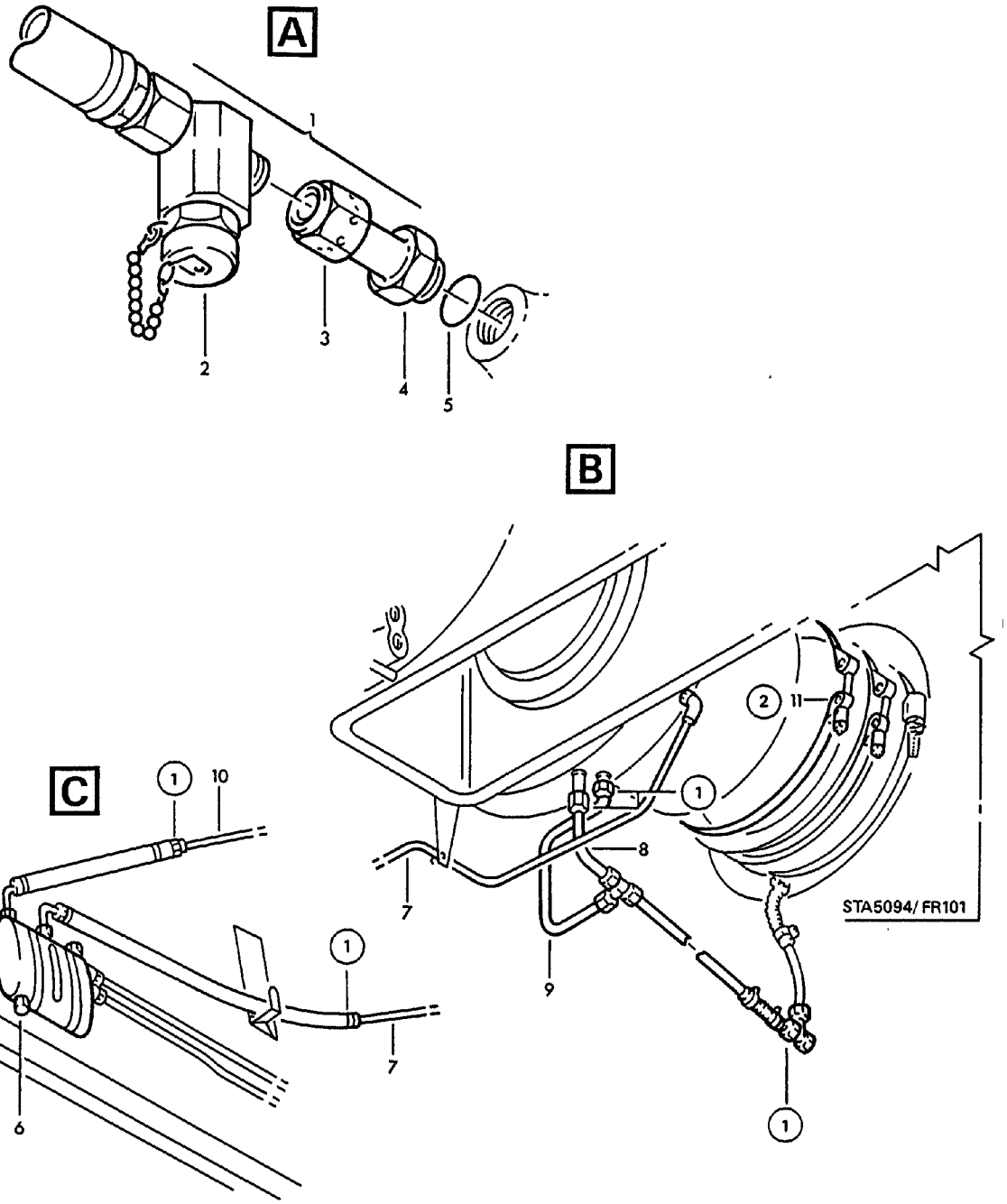
(j)Remove load from APU shock mounts.
WARNING : WHEN LOWERING THE APU, MAKE SURE THAT THE TRANSPORTATION TROLLEY IS IN THE CORRECT POSITION. LOWER DIRECTLY INTO POSITION ON TO THE TROLLEY. DO NOT TRY TO FORCE THE APU ON TO THE TROLLEY.
(k)Position assembly and transport trolley beneath APU.
(l)Remove shock mount nuts (4, 5) (Ref. Fig. 405) and install thread protectors to APU shock mount cone bolts.

CAUTION : IF APU AC GENERATOR IS NOT INSTALLED, APU WILL NOT BE IN BALANCE WHEN REMOVED FROM MOUNTS. TO AVOID UNBALANCE, SUPPORT APU AS NECESSARY.
(m)Lower APU carefully.
NOTE : Cable run must not interfere with pulley guide.
(n)Remove mount brackets (Ref. 49-12-14, P. Block 401).
(o)Position APU on trolley.
1 Install trolley adapter brackets and mount APU on trolley (3 places).
(p)Disconnect hoist from APU.
NOTE : If no serviceable APU is available and aircraft is scheduled for flight without an APU installed, install APU substitution kit (Ref. 49-10-00, P. Block 801).

(Ref. Fig. 406)



Fuel Feed Line, Drain Lines and Exhaust Connection
(Sheet 1/2)
Figure 404



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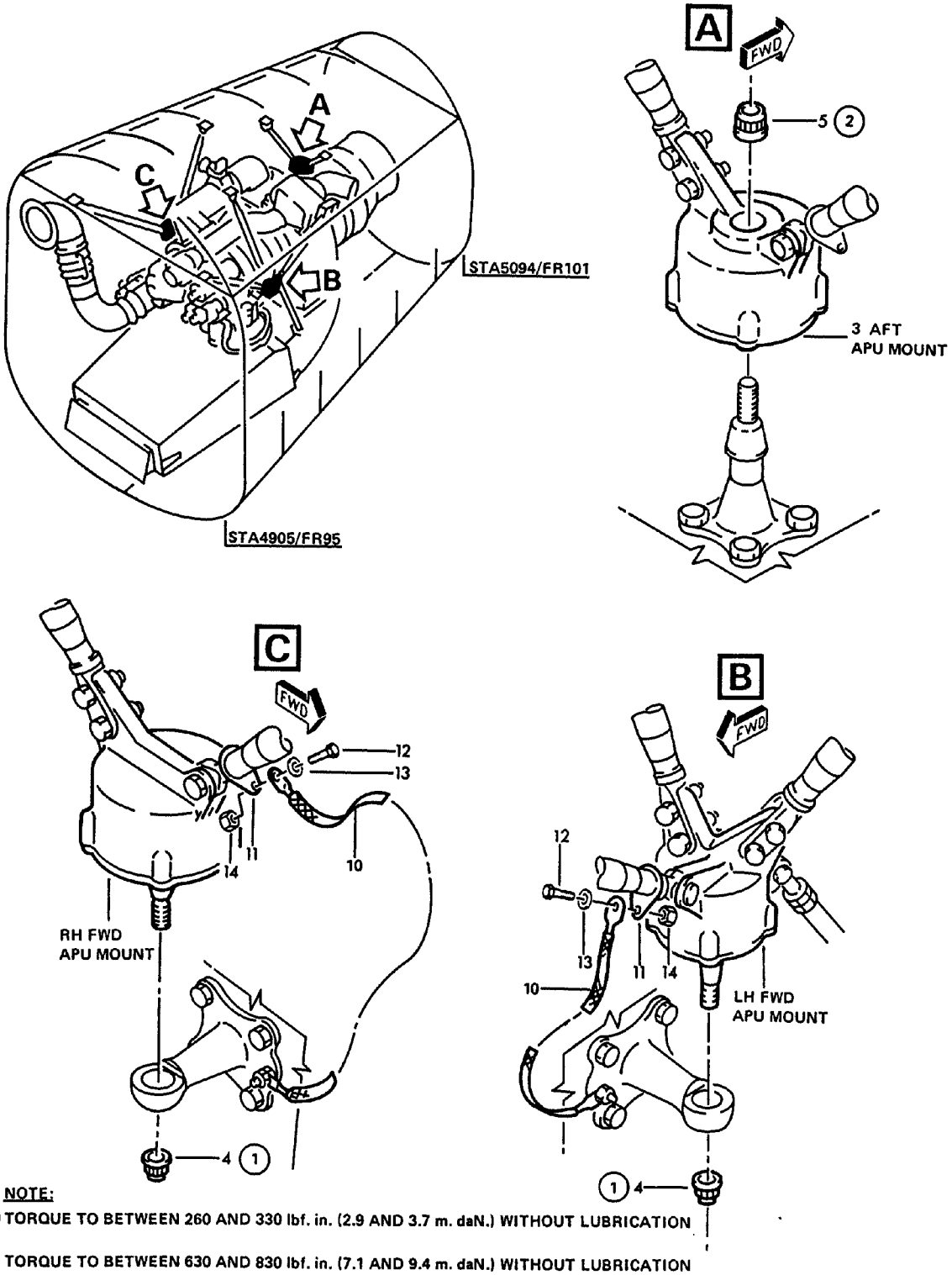
(1) CONNECTION POINT

(2) TORQUE TO BETWEEN 64.6 AND 75.2 lbf. in. (0.73 AND 0.85 mda N)

Fuel Feed Line, Drain Lines and Exhaust Connection
(Sheet 2/2)
Figure 404



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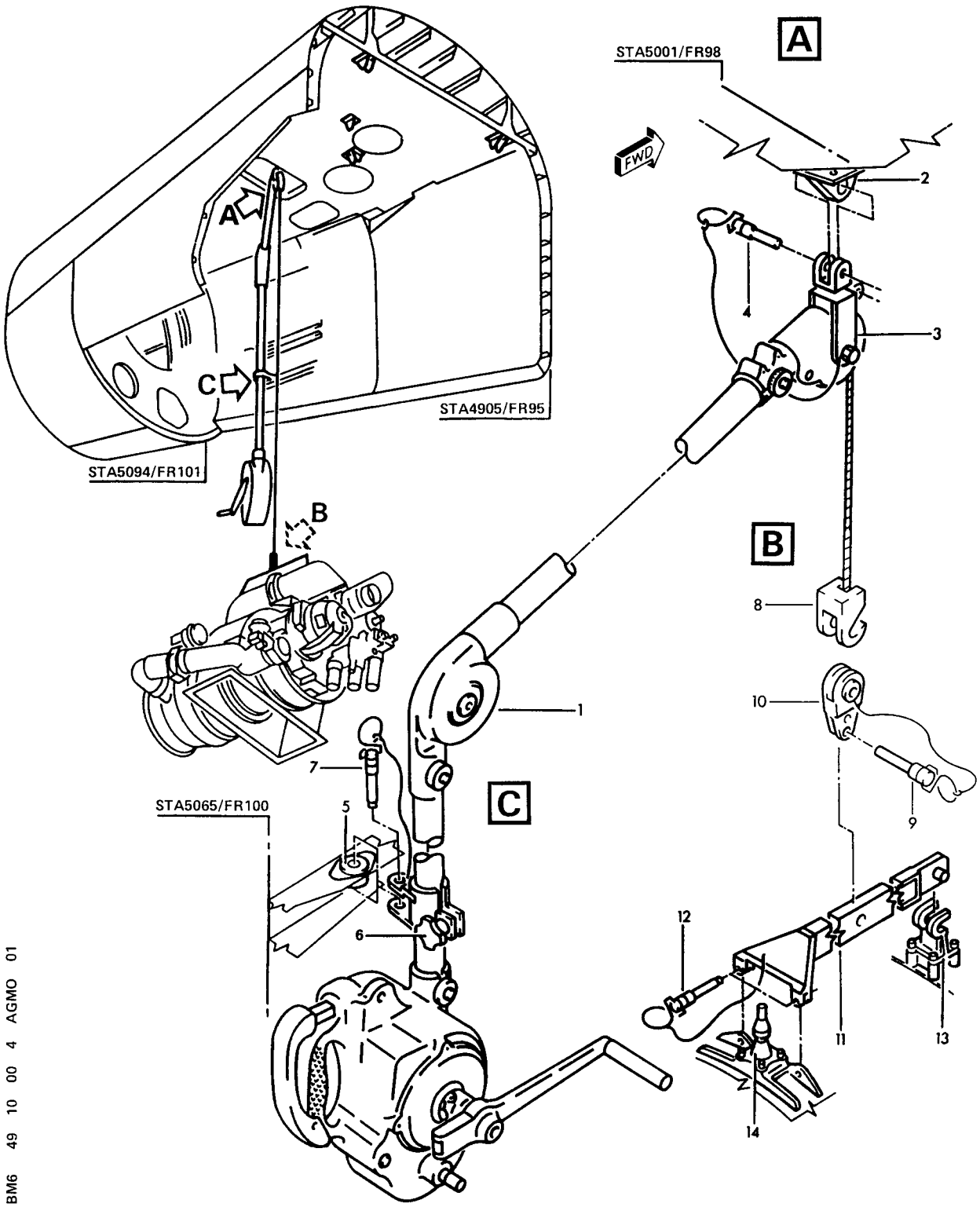
NOTE:

(1) TORQUE TO BETWEEN 260 AND 330 lbf. in. (2.9 AND 3.7 m. daN.) WITHOUT LUBRICATION

(2) TORQUE TO BETWEEN 630 AND 830 lbf. in. (7.1 AND 9.4 m. daN.) WITHOUT LUBRICATION

APU Mounts
Figure 405



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Hoist Installation
Figure 406

(3) Preparation for Installation.

NOTE : Remove items of APU substitution kit, if installed (Ref. 49-10-00, P. Block 801). Items of substitution kit are colored red.

NOTE : If required bleed Air Cover P/N A4907016100600 remains installed until load compressor cleaning run after APU replacement is carried out (refer to Para. E.).

(a)Inspect APU compartment.

1 Inspect APU shock mounts, tie-rods and structural brackets (Ref. 49-12-00, P. Block 601).
2 Inspect bleed air duct elbow connection flanges and attachments.
3 Inspect oil cooler outlet duct attach brackets (Ref. 49-52-14, P. Block 401).
4 Inspect drain tank and lines (Ref. 49-17-11, P. Block 401).
5 Inspect turbine plenum and exhaust drain hoses, Part No. BA3280 (Ref. 49-17-15 P. Block 201).
6 Clean APU compartment if necessary (Ref. 49-00-00, P. Block 701).
7 Inspect exhaust duct felt metal and sealing ring coupling (Ref. 49-81-15, P. Block 401).

(b)When replacement APU is not fully equipped, the following items must be transferred from the removed APU:

1 APU mount brackets (Ref. 49-12-14, P. Block 401).
2 APU AC generator and gasket (Ref. 24-23-11, P. Block 401).
3 Bellows of oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
4 Drain lines with appropriate brackets and clamps.

NOTE : Make certain that all transferred items are serviceable.

(3)Install spreader bar of hoist (Ref. Fig. 406).

(4) Installation

NOTE : Remove blanking caps and plugs and protective covers from all ducts, lines and electrical connectors before connection.

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

WARNING : MAKE SURE THAT THE CABLE IS NOT KINKED OR TWISTED. KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

WARNING : MAKE SURE THAT THE APU IS DIRECTLY BELOW THE INSTALLATION POINT BEFORE LIFTING THE APU INTO POSITION.

NOTE : For use of hoist refer to para. 2. B. (9).

(a)Position APU beneath APU compartment and connect hoist cable to spreader bar.
(b)Lift APU out of trolley, remove trolley adapter brackets and install APU mount brackets (Ref. 49-12-14, P. Block 401).

1 Hoist APU into APU compartment.

- Carefully insert LH and RH mount cones into brackets and AFT mount cone into shock mount.

(c)Remove thread protectors and install shock mount nuts (4, 5).

(Ref. Fig. 405).

CAUTION : TORQUE VALUES FOR FORWARD AND AFT SHOCK MOUNT NUTS ARE DIFFERENT.

1 TORQUE LH and RH mount nuts (4) to between 260 lbf.in. and 330 lbf.in. (2.9 m.daN and 3.7 m.daN.).
2 TORQUE AFT mount nut (5) to between 630 lbf.in. and 830 lbf.in. (7.1 m.daN and 9.4 m.daN).

(d)Remove hoist (Ref. Fig. 406).

1 Remove spreader bar.

(e)Install bonding straps (Ref. Fig. 405).

1 Make certain, that bonding brackets (11) on tie-rods, bonding straps (10), bolts (12), washers (13) and nuts (14) are clean.
2 Install bonding straps (10) with bolts (12), washers (13) and nuts (14) to bonding brackets (11) on tie-rods. For electrical bonding refer to 20-28-11, P. Block 1.

(f)Connect drain lines (Ref. Fig. 404).

1 Install heat shield drain line (8) and turbine plenum drain line (9) as an assembly.
2 Connect drain hoses to collector drain line (10) and fuel flow divider drain line (7).

(g)Install oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
(h)Clean threads of fitting (4), coupling nut (3) and fuel feed line with cleaning agent (Mat. No. 11-012).
(i)Check fitting, coupling nut and fuel feed line threads for damage.
(j)Lubricate new O-ring (5) with vaseline (Mat. No. 04 012).
(k)Install new O-ring (5) to fitting (4).
(l)Install fuel feed line.

1 Lubricate fuel feed line connection (1), fitting (4) and coupling nut (3) threads with lubricant (Mat. No. 06-001A).
2 Install fitting (4) (Ref. Fig. 404).
3 TORQUE fitting (4) to 5.5 m.daN (40.56 lbf.ft) and safety with lockwire.
3 Position fuel feed line (1) and attach with coupling nut (3).
4 TORQUE coupling nut (3) to 5.5 m.daN (40.56 lbf.ft) and safety with lockwire.

(m)Connect electrical connections (Ref. Fig. 402, 403).

CAUTION : MAKE CERTAIN THAT SUPPLY CONNECTION POSITIVE 8KA(+) IS CONNECTED TO STARTER MOTOR TERMINAL PRIOR TO RESISTOR ASSEMBLY.

CAUTION : WASHERS MUST BE INSTALLED BETWEEN THE TERMINAL NUTS AND PHASE LEADS. DO NOT INSTALL ANY WASHERS UNDER PHASE LEADS. LOCALIZED RESISTANCE HEATING AND BURNING OF THE TERMINAL BLOCK WILL RESULT.

1 Connect starter motor connections.

** FOR STARTER MOTOR 519858 -3,-4,-5,-6 and subsequent (Ref. Fig. 403)

- Position electrical supply connection positive 8KA(+) (6), resistor assembly (5), washer (3) and install nut (1).
- TORQUE nut (1) of positive terminal to between 0.85 m.daN (75 lbf.in.) and 0.90 m.daN (80 lbf.in.).
- Position electrical connection negative 8KA(-) (7) , washer (4) and install nut (2).

NOTE : Make certain that negative terminal post is tight in starter motor before connecting terminal.

- TORQUE nut (2) of negative terminal to between 0.56 m.daN and 0.62 m.daN (50 lbf.in.) and (55 lbf.in.).

** ON A/C ALL

2 Connect generator connections (3) 8XS T1 thru T3 and N. Install washers (4) and nuts (5).
- TORQUE nuts (5) to between 1.6 and 1.9 m.daN (144 and 168 lbf.in.).

3 Install cover (6), washers (7) and bolts (8).
- Safety bolts (8) with lockwire.

4 Connect generator control connector 8XS-A (2). Safety with lockwire.

5 Connect electrical plugs (1), P2 to socket 6032VC and P3 to socket 6033VC. Safety with lockwire.
- Install harness support clamps to structure.

(n)Exhaust muffler connection (Ref. Fig. 404).

1 Position coupling (11) onto guide ring flange.

2 Pull guide ring towards turbine heat shield flange.
- Install coupling (11) with coupling locks in 3 and 9 o'clock position.

3 TORQUE clamp (11) to between 0.73 and 0.85 m.daN (64.6 and 75.2 lbf.in).

(o)Install inlet duct (Ref. 49-16-14, P. Block 401).

(p)Check oil level in gearbox sump. Replenish, if necessary (Ref. 49-90-00, P. Block 301).

CAUTION : FUEL FEED LINE MUST BE PURGED BEFORE FIRST START IS ATTEMPTED. FAILURE TO PURGE MAY RESULT IN HOT START.

(q)Purge fuel feed line (Ref. Fig. 404).

1 Position container 2 l (0.50 US gal.) capacity, below fuel feed line vent and drain valve port (2).

2 Carry out purging of fuel feed line using vent and drain valve adapter (Ref. 49-32-11, P. Block 401).

3 Remove container.

(5) Not applicable

(6) Installation of bleed air duct elbow.

(a)Install bleed air duct elbow (Ref. Fig. 401).

1 Position and support bleed air duct elbow (3).
2 Connect tie-rods (7) and install bolts (4), washers (5) and nuts (6).
3 Align bleed air duct elbow (3) with bleed load valve (1).
4 Install clamp (2).
NOTE : Make certain that bleed air duct elbow (3) is installed without tension.
5 Connect bonding strap (11) with screw (10), washer (9) and nut (8).
For electrical bonding refer to 20-28-11, P. Block 1.

(b)Activate APU bleed load valve (Ref. Fig. 401).

1 Remove blanking caps and bleed air cover (12).
2 Install electrical connector P20 (16) and safety with lockwire.

3 Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.

(c)Clean APU compartment, if necessary (Ref. 49-00-00, P. Block 701).

(7) Test
(a)Erase ECB memory (Ref. 49-00-00, P. Block 501).
(b)Perform operational test (Ref. 49-00-00, P. Block 501).
NOTE : Both air conditioning packs must be operated during the first run with bleed air duct elbow installed after installation of an APU for a minimum of 10 minutes. If an odor is detected in flight or passenger compartment, carry out cleaning procedure of both water separators (Ref. 21-51-16, P. Block 301) and the air conditioning duct (Ref. 21-51-00, P. Block 301).
(c)Check connection of bleed air duct elbow, during APU run.
NOTE : Slight, diffused air leakage at bleed air duct connection is permitted, but a jet-like escape is not permissible.

(8) Close-Up
(a)Install access doors 315AL and 316AR (Ref. 52-41-21, P. Block 401) if removed.
(b)Check alignment of oil cooler outlet duct and door outlet duct (Ref. 49-52-14, P. Block 401).
(c)If necessary, apply lubricant (Mat. No. 05-027) thinly to the following areas (Ref. 51-75-10, P. Block 801):
- fire detection loop attachments
- APU suspension structural brackets and shock mounts

- bleed air duct tie-rod attachments
- air inlet duct tie-rod attachments
- bolt of exhaust coupling clamp
- access door hinges.

(d)Make certain that working areas are clean and clear of tools and miscellaneous items of equipment.
(e)Close access doors 315AL and 316AR. Remove access platform.
(f)Return horizontal stabilizer to operating condition (Ref. 55-00-00, P. Block 301).

POWER PLANT - FLIGHT WITHOUT APU - APPROVED REPAIRS

WARNING : THE APU SUBSTITUTION KIT MUST BE INSTALLED WHENEVER AIRCRAFT FLIGHT IS PLANNED WITHOUT AN APU INSTALLED. INSTALLATION OF THE APU SUBSTITUTION KIT IS A TEMPORARY MEASURE ONLY, PENDING SUBSEQUENT INSTALLATION OF A NEW OR SERVICEABLE APU.

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

CAUTION : MAKE CERTAIN THAT RETAINED AIRCRAFT COMPONENTS ARE SERVICEABLE PRIOR TO INSTALLATION.

A. Reason for the Job

(1) Installation and Removal of Flight without APU Kit

B. Equipment and Materials

ITEM	DESIGNATION	
1. A4907015200051	Flight without APU Kit:	
NOTE : For components of flight without APU refer to IPC chapter 49-11-04.		
2. 98A49107504001	Protector - Thread, APU Mounting Bolts	O
3.	Blanking Caps and Protective Cover	
4.	Corrosion-Resistant Steel Lockwire, 0.04 in. (1 mm) dia.	
5.	Corrosion-Resistant Steel Lockwire, 0.032 in. (0.8 mm) dia.	

Referenced Procedures

- 49-10-00, P. Block 401	Power Plant	D
- 49-12-00, P. Block 601	APU Mounts	D
- 49-16-12, P. Block 201	Air Intake Flap Actuator (50KB)	D
- 49-17-11, P. Block 401	Drain Tank	D
- 52-41-21, P. Block 401	APU Access Doors	D

C. Procedure

(1) Installation of Flight without APU Kit
(a)Job Set-Up

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1 Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

2 Make certain that the following circuit breakers are opened, safetied and tagged.

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/FUEL PUMP/SUPPLY	1QC	A53
131VU	APU/IND OIL QTY	1KK	A54
131VU	APU/IND N	1KN	A55
131VU	APU/IND EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB B	2WF	A61
131VU	APU/FUEL LP VALVE/CTL	4WF	A62
131VU	APU/FUEL LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP A	1WG	B59
131VU	APU/FIRE EXTING/AUTO EXTING GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB A	1WF	B61
131VU	APU/FUEL ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/APU BLEED VALVE/CTL + WARN	4HV	G55
133VU	ELEC/APU GEN GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN GCU/WARN	5XS	U84

3 Open, safety and tag the following circuit breaker:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/AIR INTAKE FLAP	1KB	B55

Close air intake flap manually (Ref. 49-16-12, P. Block 201), if electrical actuation system of air intake flap failed.

NOTE: With APU MASTER SW in OFF position, air intake flap is normally closed.

(b)Installation of APU substitution Kit

NOTE: Components of Flight without APU Kit are colored red. components removed by this procedure, must be retained for subsequent installation of APU.

1 Suspension and Electrical Connections

(Ref. Fig. 407)

- Remove nut (6), bolt (7) and air intake LH tie-rod (8).
- Position and support cross member (9). Remove thread protectors and install washers (10) and nuts (11).

NOTE: Nuts (11) are not components of flight without APU Kit. Use APU attachment nuts (Ref. 49-10-00, P. Block 401).

- Connect starter cables 8KA(+) (13) and 8KA(-) (14), and secure with nuts (12).
- Connect generator cables 8XS T1-T4 (17) and secure with nuts (18).
- Remove blanking cap and connect generator control 8XSA (16).
- Install blanking caps (15) on connector sockets 6032VC and 6033VC.
- Position rear suspension (2) and install bolt (3), washer (4) and nut (5). Remove thread protector and install nut (1).

NOTE: Nut (1) is not a component of flight without APU Kit. Use APU attachment nut (Ref. 49-10-00, P. Block 401).

2 Fuel and Drain Lines

(Ref. Fig. 408)

- Install blanking cap (4) on fuel feed line. Position fuel feed line on bracket at FR95 as shown and secure with lockwire, 0.04 in. (1 mm dia.).
- Remove nut (10), screw (9) and release clamp (8). Disconnect and remove drain hoses (2). Install blanking caps (3).
- Install blanking cap (1) on drain line fitting.

3 RH Tie-Rods of Air Inlet Duct

- Remove nuts (7), bolts (6) and tie-rods (5).

4 Exhaust Muffler

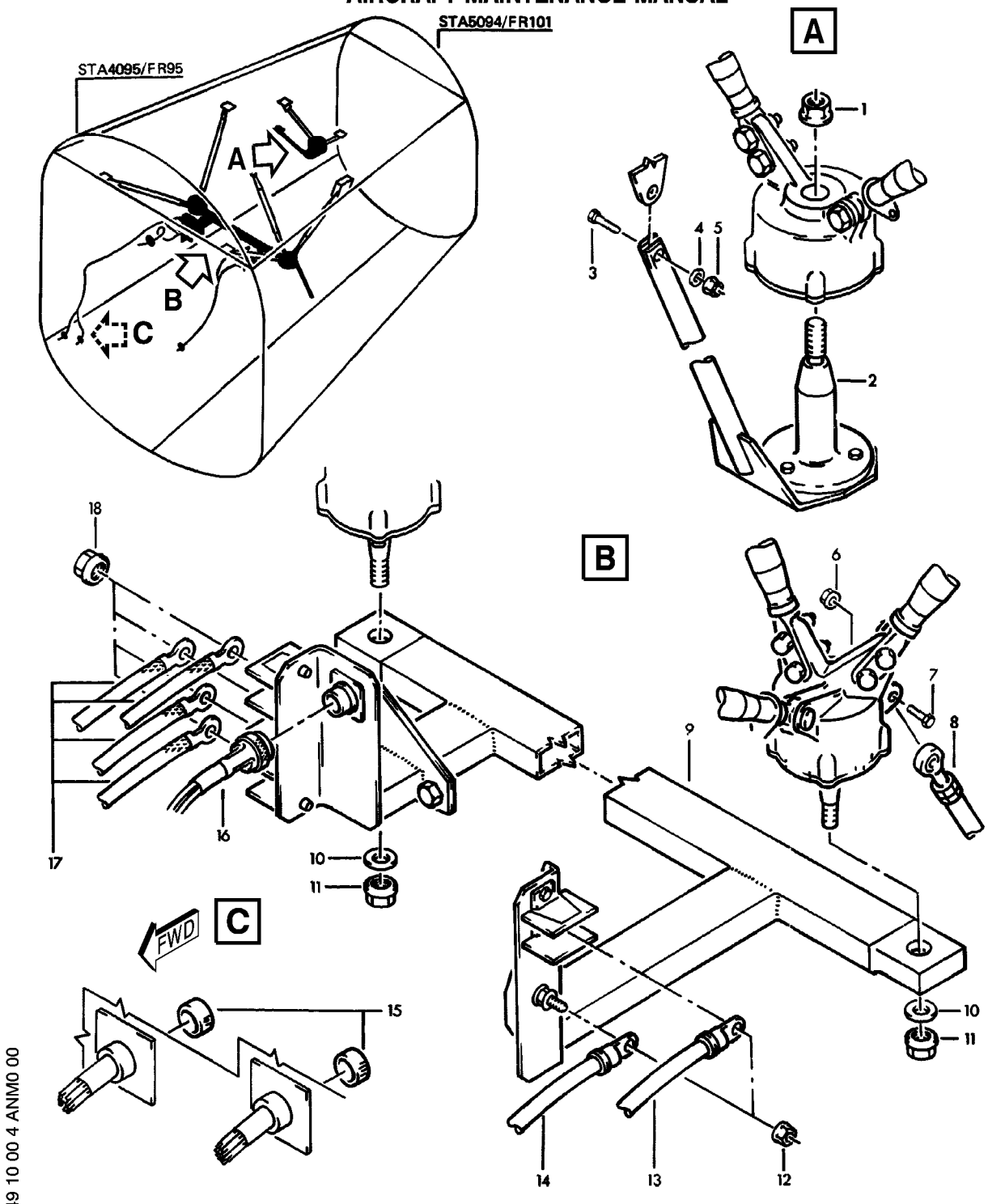
(Ref. Fig. 409)

- Release clamp (11) and remove exhaust coupling and bellows (12).
- Position clamp halves (10) on exhaust muffler at 12 and 6 o'clock positions and install bolts (16).
- Open access fairing 317. Position exhaust cover (9) and close access fairings.

5 Bleed Air Duct

- Remove protective cover and position bleed air cover (7). Connect tie-rods (17) and install bolts (8), washers (6) and nuts (5).
- Connect bonding strap (1) with screw (2), washer (3) and nut (4).

NOTE: Bolts (8), washers (6, 3) and nuts (5, 4) are not



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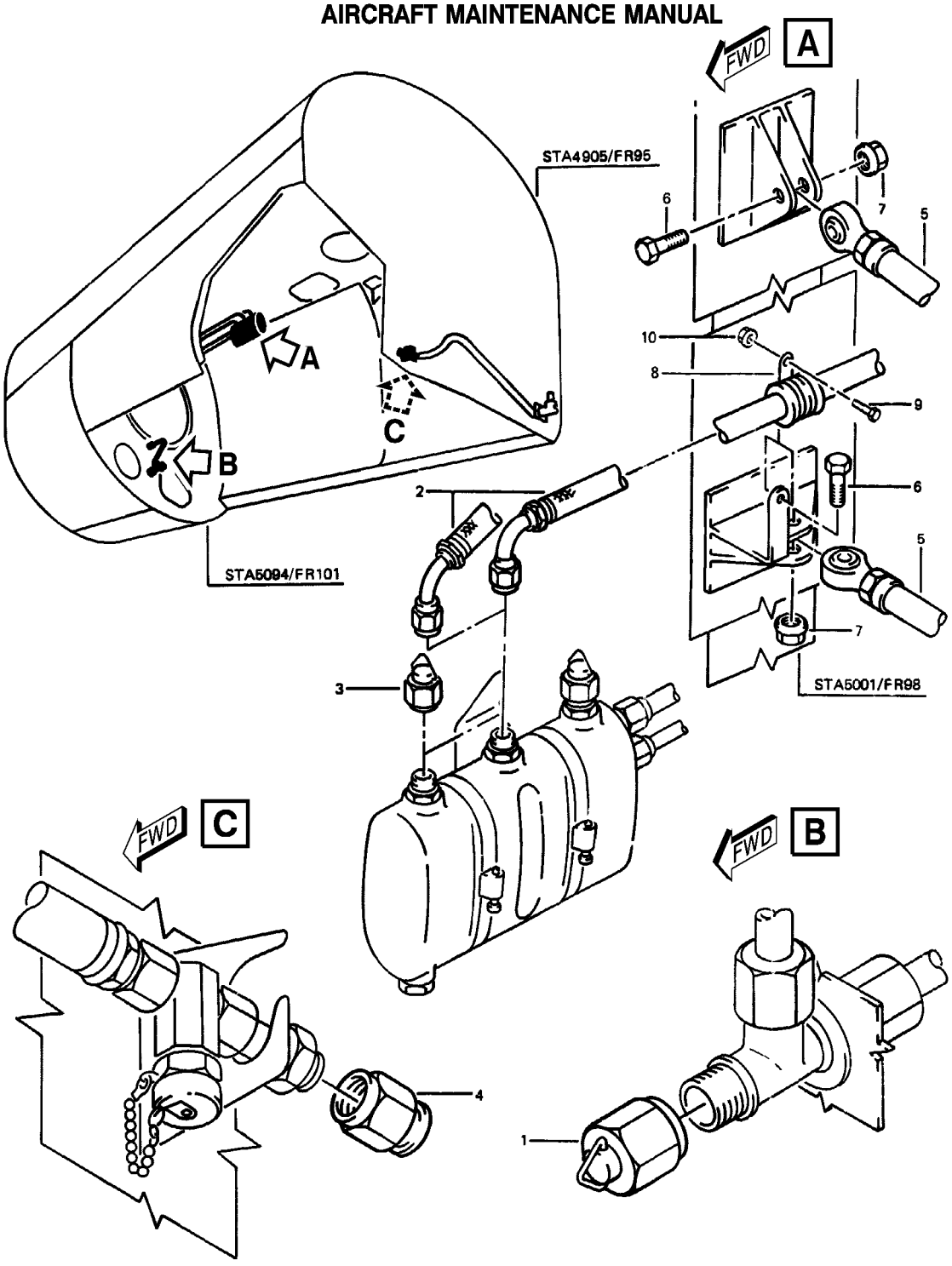
Suspension and Electrical Connections
Figure 407



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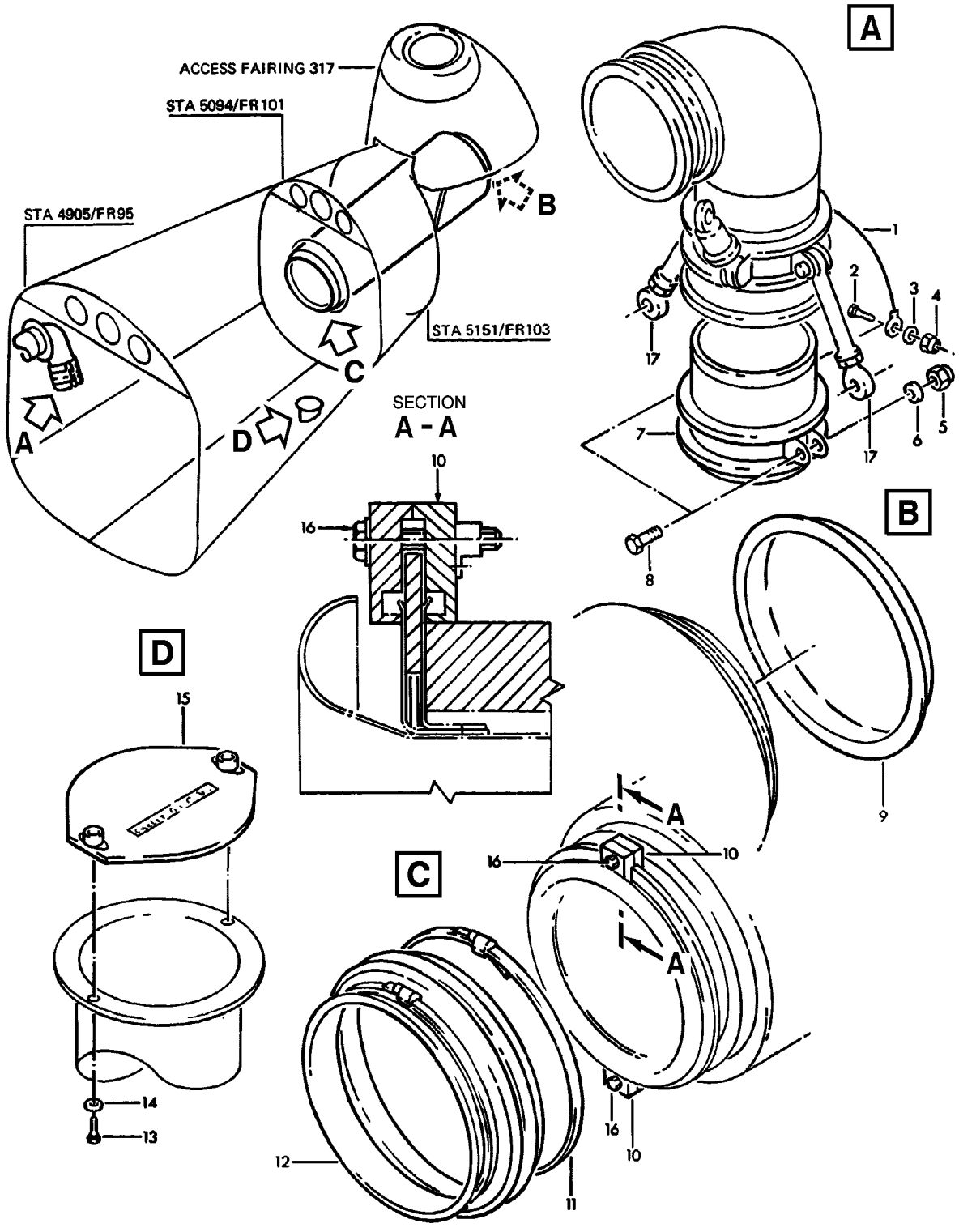
Fuel Feed and Drain Lines
Figure 408



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Exhaust Muffler Bleed Air Duct and Oil Cooler Outlet
Figure 409

components of flight without APU Kit. Use bleed air duct components.

6 Install access doors 315AL and 316AR (Ref. 52-41-11, P. Block 401).
7 Oil Cooler Outlet
- Position oil cooler cover (15) and install washers (14) and bolts (13).

(c)Close-Up
1 Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
2 Close access doors 315AL and 316AR and remove access platform.
3 Remove safety clips and tags and close circuit breakers 30WF, 1WF, 7WF, 2WF, 3WG, 1WG and 2WG.
4 Make an entry in the aircraft technical logbook.

(2) Removal of Flight without APU Kit
(a)Job Set-Up
1 Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB B	2WF	A61
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP A	1WG	B59
131VU	APU/FIRE EXTING/AUTO EXTING GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB A	1WF	B61

2 Make certain that all other circuit breakers listed in Para. 3.A.(1)(a) are opened, safetied and tagged.
3 Position access platform and open access doors 315AL and 316AR.

(b)Removal
CAUTION : MAKE CERTAIN THAT RETAINED AIRCRAFT COMPONENTS ARE SERVICEABLE PRIOR TO INSTALLATION.
1 Exhaust Muffler.
(Ref. Fig.)
- Open access fairing 317 and remove exhaust cover (9). Close access fairing.
-Remove bolts (16) and clamps halves (10).
-Position bellows and exhaust coupling (12) and secure with clamp (11). Safety clamp with lockwire, (0.032 in.) (0.8 mm) dia.
NOTE : Drainage overflow lip of exhaust coupling must be located at 6 o'clock position.
2 Electrical Connections and APU Mount Suspensions.
(Ref. Fig. 407)
- Remove nut (1) and fit thread protector. Remove nut (5), washer (4) and bolt (3) and rear suspension (2).
- Remove nuts (12) and disconnect starter cables 8KA(-) (14) and

8KA(+) (13). Reinstall nuts.
- Disconnect generator control cable 8XSA (16) and fit blanking cap.
- Remove nuts (18) and disconnect generator cables 8XS T1-T4 (17). Reinstall nuts.
- To prevent damage during APU installation, temporarily secure generator and starter harnesses at FR95.
- Support cross member (9) and remove nuts (11) and washers (10). Fit thread protectors and remove cross member.
- Position air inlet duct LH tie-rod (8) and isntall bolt (7) and nut (6).
- Inspect APU shock mounts, tie-rods and structural brackets (Ref. 49-12-00, P. Block 601).

3 Fuel Feed and Drain Lines.
(Ref. Fig. 408)
- Cut and remove securing lockwire from bracket and fuel feed line.
- Inspect drain tank and drain lines (Ref. 49-17-11, P. Block 401).
- Remove blanking caps (3) and install drain hoses (2).
- Position clamp (8) and install screw (9) and nut (10).

4 RH Tie-Rods of Air Inlet Duct
- Position tie-rods (5) and install bolts (6) and nuts (7).

5 Bleed Air Duct (Ref. Fig. 409)
- Remove nut (4), washer (3), screw (2) and disconnect bonding strap (1).
- Support bleed air cover (7), remove nuts (5), washer (6) and bolts (8). Disconnect tie-rods (17) and remove bleed air cover.
- Inspect bleed air duct connection flanges and attachment. Fit protective cover.

6 Oil Cooler Outlet (Ref. Fig. 409)
- Remove bolts (13), washers (14) and oil cooler cover (15).

7 Remove the following blanking caps during APU installation procedure.
- From electrical connector sockets 6032VC and 6033VC (15) (Ref. Fig. 407)
- From fuel feed line (4) (Ref. Fig. 408)
- From drain line fitting (1) (Ref. Fig. 408)

(c)Test

1 Carry out Functional Test of air intake flap (Ref. 49-16-12, P. Block 201).

(d)Close-Up

1 Make certain that Flight without APU Kit is complete.
2 Install APU (Ref. 49-10-00, P. Block 401).
3 Clear entry in the aircraft technical logbook.

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

WARNING : BEFORE STARTING THE APU, IF APU ACCESS DOORS ARE OPEN OR REMOVED, MAKE CERTAIN THAT FIRE FIGHTING PERSONNEL AND ADEQUATE FIRE FIGHTING EQUIPMENT ARE PRESENT.
DANGER AREAS MUST BE CLEAR OF PERSONNEL, EQUIPMENT, TOOLS AND LOOSE EQUIPMENT.

WARNING : DO NOT TRY TO START THE APU AGAIN DURING A REFUEL/DEFUEL PROCEDURE AFTER AN AUTOMATIC SHUTDOWN OR FAILED APU START.
IF YOU DO, THERE IS A RISK OF INJURY AND/OR DAMAGE.

WARNING : WHILE THE APU OPERATES, DO NOT GO INTO THESE AREAS:
- THE AREA BEHIND THE APU EXHAUST DUCT: 25m (82ft.) REARWARD OF THE DUCT, MORE THAN 3m (10ft.) ABOVE THE GROUND, AND THE WIDTH OF THE HORIZONTAL STABILIZER
- THE AREA AROUND THE APU AIR-INTAKE: 2m (7ft.) AROUND THE INTAKE
- THE AREA OF THE OIL-COOLER OUTLET.

THERE IS A RISK OF INJURY IF YOU GO INTO THESE AREAS.

CAUTION : AVOID APU OPERATION DURING DE-ICING PROCEDURE. INGESTION OF DE-ICING FLUID CAN CAUSE INTERNAL CONTAMINATION OF ENGINE AND BLEED AIR SYSTEM.

CAUTION : USE LH INNER TANK PUMP 2 FOR FEEDING APU FUEL SYSTEM, IF ELECTRICAL GROUND POWER UNIT IS CONNECTED TO ENERGIZE THE AIRCRAFT ELECTRICAL NETWORK, OR APU GENERATOR IS SET ON LINE.

1. General
This page Block contains information for carrying out run-up procedure under no-load condition.

2. Safety Precautions
WARNING : BEFORE STARTING THE APU, IF APU ACCESS DOORS ARE OPEN OR REMOVED, MAKE CERTAIN THAT FIRE FIGHTING PERSONNEL AND ADEQUATE FIRE FIGHTING EQUIPMENT ARE PRESENT.
DANGER AREAS MUST BE CLEAR OF PERSONNEL, EQUIPMENT, TOOLS AND LOOSE EQUIPMENT.

A. Before starting and operating the APU the following safety precautions must be observed:

R NOTE :When the aircraft has been parked in a temperature of -15 °C
R (+5 °F) or lower it is recommended to use an External Ground
R Power Unit to start the APU. Make certain that the APU air intake
R and Air Conditioning Packs deflect doors and modulating flaps
R are free from snow and ice.

- Make certain that the Batteries are selected ON.
- Make certain that all personnel are standing clear of the danger areas (Ref. Para. C.).
- Make certain that fire detection and extinguishing system is serviceable (Ref. 26-13-00, P. Block 501 and 26-22-00, P. Block 501).
- Make certain that all blanking plugs and covers are removed.

- Make certain that A/C fuel system and APU fuel system are serviceable and fuel quantity is adequate.
- Make certain that drain apertures are not obstructed.
- The APU drain tank has to be drained after a series of three shut-downs without flying (Ref. 49-17-11, P. Block 401).
- APU emergency shutdown must be carried out immediately (Ref. 49-62-00, P. Block 1), if any of the limitations (Ref. Para. 3.) are exceeded or any of the following conditions occur:
  . smoke
  . unusual noises
  . fuel or oil leakage
- Do not exceed starter duty cycle (Ref. Para. 3.).

B. In case of APU fire on ground, interrupt start or operation immediately and carry out one of the following actions:
  (1)On APU FIRE control module 20WG:
    - Pull APU FIRE handle
    - Press AGENT pushbutton, if necessary
  (2)On nose landing gear ground interphone box 3WC:
    - Press APU SHUT OFF pushbutton.
C. Danger Areas
  (1)Exhaust
    - up to 20 m (66 ft.) from the APU exhaust duct
    - more than 3 m (10 ft.) above ground level
    - as wide as horizontal stabilizer
  (2)Air Intake and Oil Cooler Air Outlet
    - area of 2 m (6 ft.) dia. around the APU air intake.
    - area around the oil cooler air outlet.

3. Limitations

OBSERVATION OR CONDITION	LIMIT REQUIREMENT
Speeds	
No Load	100.0% (40,142 RPM)
Electrical Load	100.0% (40,142 RPM)
Bleed Load ECS	100.0% (40,142 RPM)
Bleed Load MES	101.0% (40,712 RPM)
Bleed Load Anti Icing	102.0% (41,142 RPM)
Maximum Allowable (Overspeed Shutdown)	107.0% (42,952 RPM)
Temperatures (Ref. 49-00-00, P. Block 501)	
EGT (MES, ECS)	532 °C (990 °F)
(During Acceleration, up to 50% RPM)	899 ± 14 °C (1650 ± 25 °F)
(Overtemperature Shutdown, Operating Condition)	585 ± 14 °C (1085 ± 25 °F)
Oil (Operating Condition)	between 74 °C (165 °F) and 135 °C (275 °F)
(Overtemperature Shutdown, HOT)	152 ± 4 °C (305 ± 7 °F)
Pressures	
Oil (Operating Condition, at Gearbox)	3.45 - 4.83 bar (50 - 70 psi)
(Low Oil Pressure Shutdown, LOP)	2.07 - 2.76 bar (30 - 40 psi)
Fuel Inlet	0.69 - 3.79 bar (10 - 55 psi)
Oil Quantity max.	4/4 = 5.7 l (6.0 qts)
min. to start APU	1/4 on gage

OBSERVATION OR CONDITION		LIMIT REQUIREMENT
Leakages		
Mid Bearing Seal and Forward Bearing Vent	Driven Compressor (Normal)	None (Oil)
	(Malfunction)	50 cc/h (Oil)
Fuel/Oil Pump Drain	(Normal)	5 cc/h (Fuel) 1 cc/h (Oil)
	(Malfunction)	60 cc/min (Fuel) 150 cc/h (Oil)
Actuator Drain	(Normal)	3 drops/min. (Fuel)
	(Malfunction)	50 cc/min (Fuel)
Turbine Plenum Drain	(Normal)	None (Fuel)
	(Malfunction)	300 cc/false start (Fuel)
Heat Shield Drain	(Normal)	None (Fuel)
	(Malfunction)	300 cc/false start (Fuel)
Flow Divider Drain	(Normal)	75 cc/shutdown (Fuel) 10 cc/startup (Fuel)
	(Malfunction)	100 cc/min (Fuel)
Starter Duty Cycle (Starting Operation)		
Below 37000 feet (11278 m)		3 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 3rd attempt the starter motor must cool down for at least 60 minutes.
Above 37000 feet (11278 m)		5 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 5th attempt the starter motor must cool down for at least 60 minutes.
Engine Acceleration Time (standard day)		
- normal operation from time operator initiates start		7% RPM = 5 seconds 42% to 50% RPM = 30 seconds (starter cuts out, DC voltmeter should pulse upward) 95% RPM = 45 seconds 100% RPM = 55 seconds

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.

NOTE : With ECB 2117402-11 and subsequent installed, at altitudes above 36000 feet (10972 m) the starter motor cycle is extended and cuts out at 55% RPM engine speed.

4. Operational Test, Battery Assisted APU Start

NOTE : For Operational Test with Ground Power Unit Assisted APU Start refer to para 5.

A. Reasons for the Job
(1)Run-Up of APU
(2)Tests after maintenance procedures

Referenced Procedures

- 12-13-49, P. Block 1	APU - Replenishing
- 24-23-00, P. Block 301	Auxiliary AC Generation
- 31-51-00, P. Block 201	ECAM System
- 33-17-00, P. Block 501	Memorized Fault Annunciators

B. Procedure
(1)Job Set-Up
(a)Energize the aircraft electrical network (Ref. 24-23-00, P. Block 301).

(b)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/FUEL PUMP/SUPPLY	1QC	A53
131VU	APU/IND OIL QTY	1KK	A54
131VU	APU/IND N	1KN	A55
131VU	APU/IND EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB B	2WF	A61
131VU	APU/FUEL LP VALVE/CTL	4WF	A62
131VU	APU/FUEL LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP A	1WG	B59
131VU	APU/FIRE EXTING/AUTO EXTING GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB A	1WF	B61
131VU	APU/FUEL ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/COMP TEMP/APU BLEED VALVE/ CTL & WARN	4HV	G55
133VU	ELEC/APU GEN GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN GCU/WARN	5XS	U84
133VU	HYD/L/G PROX DET/RELAYS/SYS 2 GEAR DOWN/OVHD PNL/POS IND	83GB	V51

(2)Pre-start checks

ACTION	RESULT
CAUTION : BAT PUSHBUTTONS MUST BE IN AUTO POSITION DURING APU OPERATION TO ENSURE THAT FIRE PROTECTION SYSTEM IS OPERATIVE AT ALL TIMES.	
1. On ELEC PWR panel 424VU: - Make certain that BAT pushbuttons are in AUTO position. - Make certain that APU GEN pushbutton is released.	On ELC PWR panel 427VU: - OFF/R legend off. - Flowbars are on. - AC EMER ON INV annunciator is on. - OFF/R legend is on.
2. On ELEC IND panel 425VU: - Rotate DC volts/amps selector through BAT positions.	On ELEC IND panel 425VU: - DC V indicator shows each battery voltage 28 V normal, 21 V min.
3. On AIR BLEED panel 436VU:	On AIR Bleed panel 436VU:

ACTION	RESULT
- Make certain that APU BLEED switch is in OFF/R position.	- Flowbar is off.
4. On FUEL panel 430VU:	On Fuel panel 430VU:
- Make certain that all PUMP push-buttons are released.	- OFF legends are on.
- Make certain that LH INR TK ISOL VALVE pushbutton is pressed.	- OFF legend is off. - Flowbar is on.
- Make certain that APU LP VALVE is open.	- SHUT legend is off. - Flowbar is on.
5. On maintenance panel 472VU:	On maintenance panel 472VU:
- Check OIL QTY indication, Replenish if necessary (Ref. 12-13-49, P. Block 1).	- Min. quantity indication: 1/4 on gage.
- Place switch ANN LT in READ position. Carry out MFA test (Ref. 33-17-00, P. Block 501).	- If any fault information is stored, refer to TSM.
6. On APU panel 429VU:	
- Make certain that FUEL PUMP pushbutton is in the AUTO position.	

(3)Starting

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to ON position.	On APU Panel 429VU: - FUEL PUMP legend LO PR comes on. - LO PR legend goes off when minimum fuel pressure is reached. On maintenance panel 472VU: - ISOL VALVE annunciator legend OPEN comes on. On APU Air Intake: - APU Air Intake Flap opens. NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
2. On APU panel 429VU: - Press START pushbutton 2KA to latched position.	On APU panel 429VU: - START pushbutton ON legend comes on. On ECB (59KD): - Pre-start BITE test is initiated. NOTE : This will inhibit APU start until accomplishment after approx. 2 seconds.
- Record start time.	On APU panel 429VU: - START pushbutton ACCEL legend comes on if ECB pre-start BITE test is accomplished and Air Intake Flap is fully open.
3. Continuously monitor N and check acceleration: - Check at 7% N.	On maintenance panel 472VU: - N indication increases. - EGT increases. - Steady: Surge free rise of EGT and N indications.
- Check at 42% to 50% N.	On APU panel 429VU: - START pushbutton ON legend goes off. - START pushbutton releases automatically. On maintenance panel 472VU: - N indication increases. - EGT indication increases.
NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original tolerance of 42%. This is an indication lag and does not affect the operation of the APU.	
- Check at 95% N.	On APU panel 429VU: - START pushbutton ACCEL legend goes off.

ACTION	RESULT
	- On annunciator 8KA AVAIL legend comes on. On maintenance panel 472VU: - EGT within limits.

CAUTION : WITH START SEQUENCE INITIATED, USING BATTERY POWER, SET APU GENERATOR ON LINE TO AVOID DISCHARGE OF BATTERIES.

(4)Set APU Generator On Line:

ACTION	RESULT
1. On ELEC PWR panel 424VU: - Press APU GEN pushbutton.	On ELEC PWR panel 424VU: - OFF/R legend goes off. - Annunciator AC BUS 1 OFF and AC BUS 2 OFF go off. - Annunciators AC EMERG ON INV goes off. - Flowbars are on. NOTE : Flowbars are on when batteries are under charge. When batteries reach fully charge condition flowbars go off.
- Make certain, that the electronics rack ventilation is correct.	
2. Energize ECAM system (Ref.31-51-00, P. Block 201). - On ECAM SDU: - Select APU page.	On ECAM SDU: - AVAIL legend is on. On maintenance panel 472VU and ECAM SDU: - EGT and RPM within limits.
3. 30 sec. after reaching 95% N.	On ECAM SDU: - APU page goes off.
NOTE : If necessary, press APU pushbutton on ECAM control panel. APU page comes on.	
	On maintenance panel 472VU and and ECAM SDU: - N indication reads 100%.
4. On ELEC IND panel 425VU: - Rotate AC selector to APU GEN position and check indications.	On ELEC IND panel 425VU: - AC LOAD, AC V and FRQ HZ indications must be within the limits on the "white arc" on the related indicator.

(5)Use LH INR TK PUMP 2 for feeding APU fuel system:

ACTION	RESULT
1. On FUEL panel 430VU: - Press LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend goes off.

(6)Shutdown

ACTION	RESULT
1. On FUEL panel 430VU: - Release LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend comes on.
2. On APU panel 429VU: - Place APU MASTER SW to OFF position. NOTE : When APU is running with pneumatic load selected and the APU MASTER SW is placed to OFF position, the bleed load valve closes automatically, followed by a 60 sec. cooling delay period before shutdown.	On APU panel 429VU: - Annunciator AVAIL legend goes off. On ECAM SDU: - AVAIL legend goes off. On AIR BLEED panel 436VU: - APU BLEED annunciator flowbar goes off. On maintenance panel 472VU and ECAM SDU: - ISOL VALVE annunciator OPEN legend goes off, and annunciator SHUT legend comes on. - EGT and N indications decrease. - EGT indication deflects up scale momentarily due to ECB self-test of overtemperature shutdown circuit. On ELEC PWR panel 424VU: - OFF/R legend goes off. - Flowbars come on. - AC EMER ON INV annunciator comes on.
3. At 95% N:	- APU fuel pump is de-energized. - APU isolation valve shuts. - ECAM goes off.
4. At 7% N:	- ECB is de-energised On APU Air Intake: - APU Air Intake Flap closes.

ACTION	RESULT
5. 60 sec. after N decreases to 7%: - indication circuits are - de-energised.	On maintenance panel 472VU: - EGT and N indicates zero
6. On maintenance panel 472VU: - Place switch ANN LT in READ position. Carry out MFA test (Ref. 33-17-00, P. Block 501).	On maintenance panel 472VU: - If any fault information is stored, refer to TSM.

(7)Close-Up
(a)De-energize appropriate systems which were used for test requirements.
(b)De-energize aircraft electrical network (Ref. 24-23-00, P. Block 301).
(c)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

5. Operational Test, Electrical Ground Power Assisted APU Start
NOTE : For Operational Test with Battery Assisted APU Start refer to para 4.

A. Reasons for the Job
(1)Run-Up of APU
(2)Tests after maintenance procedures

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz,

Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-41-00, P. Block 301	AC External Power Control
- 31-51-00, P. Block 201	ECAM System
- 33-17-00, P. Block 501	Memorized Fault Annunciators

C. Procedure
(1)Job Set-Up
(a)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Make certain that electronics racks ventilation is correct.

(c)Make certain, that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/FUEL PUMP/SUPPLY	1QC	A53
131VU	APU/IND OIL QTY	1KK	A54
131VU	APU/IND N	1KN	A55
131VU	APU/IND EGT	1KP	A56
131VU	APU/FIRE DET/LOOP B	2WG	A59
131VU	APU/FIRE EXTING/SQUIB TEST	7WF	A60
131VU	APU/FIRE EXTING/SQUIB B	2WF	A61
131VU	APU/FUEL LP VALVE/CTL	4WF	A62
131VU	APU/FUEL LP VALVE/SUPPLY	2QF	A63
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FIRE DET/FIRE WARN	3WG	B58
131VU	APU/FIRE DET/LOOP A	1WG	B59
131VU	APU/FIRE EXTING/AUTO EXTING GND TEST	30WF	B60
131VU	APU/FIRE EXTING/SQUIB A	1WF	B61
131VU	APU/FUEL ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63
131VU	AIR BLEED/COMP TEMP/APU BLEED VALVE/ CTL & WARN	4HV	G55
133VU	ELEC/APU GEN GCU/SUPPLY	6XS	U83
133VU	ELEC/APU GEN GCU/WARN	5XS	U84
133VU	HYD/L/G PROX DET/RELAYS/SYS 2 GEAR DOWN/OVHD PNL/POS IND	83GB	V51

(d)Energize ECAM system (Ref. 31-51-00, P. Block 201) select APU page.

(2)Pre-start checks

ACTION	RESULT
CAUTION : BAT PUSHBUTTONS MUST BE IN AUTO POSITION DURING APU OPERATION TO ENSURE THAT FIRE PROTECTION SYSTEM IS OPERATIVE AT ALL TIMES.	
1. On ELEC PWR panel 424VU:	On ELEC PWR panel 424VU:
- Make certain that BAT pushbuttons are in AUTO position.	- OFF/R legend is off. - Flowbars are on. NOTE : Flowbars are on when batteries are under charge. When batteries reach fully charge condition flowbars go off.
- Make certain that APU GEN pushbutton is released.	- OFF/R legend is on.
2. On ELEC IND panel 425VU:	On ELEC IND panel 425VU:
- Rotate DC volts/amps selector through BAT positions.	- DC V indicator shows each battery voltage 28 V normal, 21 V min.
3. On AIR BLEED panel 436VU:	On AIR BLEED panel 436VU.
- Make certain that APU BLEED switch is in OFF/R position.	- Flowbar is off.
4. On FUEL panel 430VU:	On FUEL panel 430VU:
- Make certain that all PUMP push-buttons are released.	- OFF legends are on.
- Press LH INR TK PUMP 2 pushbutton.	- OFF legend goes off.
- Make certain that LH INR TK ISOL VALVE pushbutton is pressed.	- OFF legend is off. - Flowbar is on.
- Make certain that APU LP VALVE is open.	- SHUT legend is off. - Flowbar is on.
5. On maintenance panel 472VU:	On maintenance panel 472VU:
- Check OIL QTY indication, Replenish if necessary (Ref. 12-13-49, P. Block 1).	- Min. quantity indication: 1/4 on gage.
- Place switch ANN LT in READ position. Carry out MFA test (Ref. 33-17-00, P. Block 501).	- If any fault information is stored, refer to TSM.
6. On APU panel 429VU:	
- Make certain, that FUEL PUMP pushbutton is in AUTO position.	

(3)Starting

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to ON position.	On APU panel 429VU: - FUEL PUMP legend LO PR comes on. - LO PR legend goes off when minimum fuel pressure is reached. On maintenance panel 472VU: - ISOL VALVE annunciator legend OPEN comes on. On ECAM SDU: - APU page comes on. On APU AIR Intake: - APU Air Intake Flap opens. NOTE : APU start is inhibited for 30 seconds maximum to allow Air Intake Flap to open.
2. On APU panel 429VU: - Press START pushbutton 2KA to latched position.	On APU panel 429VU: - START pushbutton ON legend comes on. On ECB (59KD): - Pre-start BITE test is initated. NOTE : This will inhibit APU start until accomplishment after approx. 2 seconds.
- Record start time.	On APU panel 429VU: - START pushbutton ACCEL legend comes on, if ECB pre-start BITE test is accomplished and Air Intake Flap is fully open.
3. Continuously monitor N and check acceleration:	On maintenance panel 472VU and ECAM SDU:
- Check at 7% N.	- N indication increases. - ACCEL legend comes on. - EGT increases. - Steady,surge free rise of EGT and N indications.
- Check at 42% to 50% N.	On APU panel 429VU: - START pushbutton ON legend goes off. -START pushbutton releases automatically. On maintenance panel 472VU and ECAM SDU: - N indication increases. - EGT indication increases:

NOTE : The indication on the ECAM display may show the APU start button disengages at 38%, this is 4% less than the original

ACTION	RESULT
tolerance of 42%. This is an indication lag and does not affect the operation of the APU.	
- Check at 95% N.	On APU panel 429VU: - START pushbutton ACCEL legend goes off. - On annunciator 8KA AVAIL legend comes on. On ECAM SDU: - AVAIL legend comes on. On maintenance panel 472VU and ECAM SDU: - EGT within limits.
4. 30 sec. after reaching 95% N.	On ECAM SDU: - APU page goes off.
NOTE : If necessary, press APU pushbutton on ECAM control panel. APU page comes on.	On maintenance panel 472VU and ECAM SDU: - N indication reads 100%.
(4)Set APU Generator On Line:	
NOTE : When using ground power, it is not necessary to set the APU generator on line.	

ACTION	RESULT
1. On ELEC PWR panel 424VU: - Press APU GEN pushbutton.	On ELEC PWR panel 424VU: - OFF/R legend goes off.
2. On ELEC IND panel 425VU: - Rotate AC selector to APU GEN position and check indications.	On ELEC IND panel 425VU: - AC LOAD, AC V and FRQ HZ indications within limits.

(5)Shutdown

ACTION	RESULT
1. On APU panel 429VU: - Place APU MASTER SW to OFF position. NOTE : When the APU is running with pneumatic load selected and the APU MASTER SW is placed to position, the bleed load valve closes automatically followed by a 60 sec. cooling delay period before shutdown.	On APU panel 429VU: - Annunciator AVAIL legend goes off. On ECAM SDU: - AVAIL legend goes off. On AIR BLEED panel 436VU: - APU BLEED annunciator flowbar goes off. On maintenance panel 472VU and ECAM SDU: - ISOL VALVE annunciator OPEN legend goes off, and annunciator SHUT legend comes on. - EGT and N indications decrease. - EGT indication deflects up scale momentarily due to ECB self test of overtemperature shutdown circuit.
2. At 95% N:	On APU panel 429VU: - On annunciator 8KA AVAIL legend goes off. - ECAM goes off. - APU fuel pump de-energised. - APU isol valve shuts.
3. At 7% N:	- ECB is de-energised. On APU Air Intake: - APU Air Intake Flap closes.
4. 60 sec. after N decreases to 7%: - indication circuits are de-energized.	On maintenance panel 472VU: - EGT and N indicate zero.
5. On FUEL panel 430VU: Release LH INR TK PUMP 2 pushbutton.	On FUEL panel 430VU: - OFF legend comes on.
6. On maintenance panel 472VU: - Place switch ANN LT in READ position. Carry out MFA test (Ref. 33-17-00, P. Block 501).	On maintenance panel 472VU: - If any fault information is stored, refer to TSM.

(6)Close-Up
  (a)De-energize ECAM system (Ref. 31-51-00, P. Block 201) and appropriate systems used for test requirements.
  (b)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
  (c)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

REF: MMEL 1-49, ITEM 1

1.Deactivation of APU by Circuit Breaker Tagging

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Circuit breaker(s) safety clip(s)
(2)	Warning Notice

Referenced Procedures
None

B. Job Set-up
(1)Not applicable.

C. Procedure
(1)Deactivation of the APU by opening circuit breakers.
(a)On the panel 429VU:
- Make sure that the APU MASTER SW switch is set to OFF.
- Put a Warning Notice in the cockpit to tell persons that the APU is inoperative.

(b)On the panel 436VU:
- Make sure that the APU BLEED switch is set to OFF.

(c)Open, safety and tag this(these) circuit breaker(s):

	PANEL	SERVICE	IDENT.	LOCATION
R	131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
R	131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
R	131VU	APU/FUEL/PUMP SUPPLY	1QC	A53
R	131VU	APU/START	50KA	B54
R	131VU	APU/ECB SUPPLY/MAIN	1KD	B57
R	131VU	APU/FUEL/ISOL VALVE/SUPPLY	1QF	B63

(d)Make an entry in the technical logbook that the APU is deactivated.

2.Deactivation of APU by APU Substitution Kit

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Circuit breaker(s) safety clip(s)
(2)	Warning Notice

Referenced Procedures

- 49-10-00, P. Block 401	Power Plant

B. Job Set-Up
(1)Obey the Weight Impact and Effect on Balance for Flights without APU.
(a)Weight Impact:
- 324.480 kg (- 716.061 lb.)
(b)Effect on Balance:
- 16238.077 kgm (- 117450.011 lbf.ft.).

C. Procedure
(1)Deactivation of APU.
(a)Remove the APU (Ref. 49-10-00, P. Block 401).
R (b)Install the APU Substitution Kit (Ref. 49-10-00, P. Block 401).
(c)Put a Warning Notice in the cockpit to tell persons that the APU is removed.
(d)Make an entry in the technical logbook that the APU is removed.

3. Reactivation of APU after Circuit Breaker Tagging

A. Equipment and Materials
Not applicable.

Referenced Procedure
- TSM 49, P. Block 1

B. Job Set-Up
(1)Not applicable.

C. Procedure
(1)Reactivation of the APU.
(a)Remove safety clips and tags and close circuit breakers 10QC (A51), 11QC (A52), 1QC (A53), 50KA (B54), 1KD (B57) and 1QF (B63) on panel 131VU.
(b)Do the Trouble Shooting as per TSM ATA 49, P. Block 1.

D. Close-Up
(1)Remove the Warning Notice from the cockpit
(2)Make an entry in the technical logbook that the APU is re-activated.

4. Reactivation of APU after Removal of APU Substitution Kit

A. Equipment and Materials
(1)Not applicable.

Referenced Procedures
- 49-10-00, P. Block 401 Power Plant
- 49-10-00, P. Block 801 Power Plant

B. Job Set-Up
(1)Not applicable.

C. Procedure
(1)Reactivation of the APU.
R (a)Remove the APU Substitution Kit (Ref. 49-10-00, P. Block 401).

(b)Install a new APU (Ref. 49-10-00, P. Block 401).

D. Close-Up
(1)Remove the Warning Notice from the cockpit.
(2)Make an entry in the technical logbook that the APU is re-activated.

1. Reason for the Job

To provide the APU build-up of the APU (GTCP 331-250) before installation in the aircraft.

2. Equipment and Materials

ITEM	QTY	DESIGNATION
A.		Torque Wrench: range 0.11 to 3.60 m.daN (9.5 to 318 lbf.in.)
B. 98A49207605001	1	Trolley - Assembly and Transport, APU
C. FRDH 141	1	Torque Convertor
D. Material No. 03-002		Oils (Ref. 20-31-00)
or		
E. Material No. 03-003		Oils (Ref. 20-31-00)
F. Material No. 07-020		Lacquers (Ref. 20-31-00)
G. Material No. 19-010		Miscellaneous (Ref. 20-31-00)

NOTE : The spare parts necessary to build-up the APU are listed in the IPC 49-11-04, Fig. 1 and 49-12-14, Figs. 1 and 2.

Referenced Procedures

- 49-10-00, P. Block 401	Power Plant

3. Procedure

(Ref. Fig. 201)
(Ref. Fig. 202)
(Ref. Fig. 203)
(Ref. Fig. 204)

A. Job Set-up

(1)Preparation for Build-up

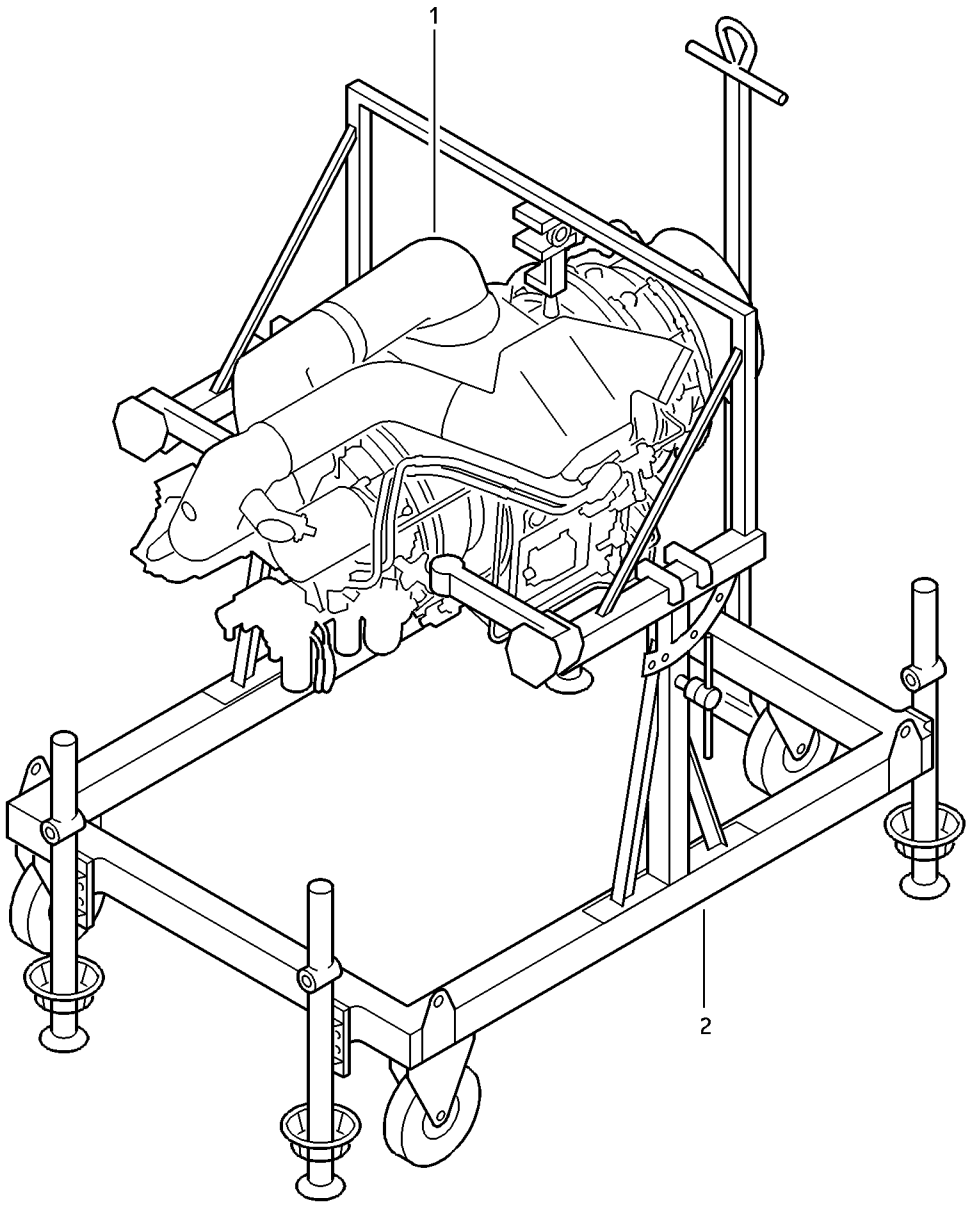
(a)Remove the Auxiliary Power Unit (APU) from the transport container.
(b)Install the APU (1) on the tranport trolley (2) (Ref. Fig. 201).

B.Procedure

(1)Installation of the APU Mount-Brackets (Ref. Fig. 202).

R NOTE: Before installation of the APU mount brackets make sure that
R the thread inserts in the APU housing show a breakaway torque
R of 0.11 m.daN (9.5 lbf.in.).

(a)Carefully put the FWD left and FWD right mount-brackets (3) and (4) in position on the mount pads, on the accessory drive gearbox.
(b)Make sure that the spigot is correctly engaged in the APU.
(c)Install the bolts (5) at each of the mount-brackets (3) and (4).
(d)TORQUE the bolts (5) to between 2.6 and 3.0 m.daN (230 and 265 lbf.in.).



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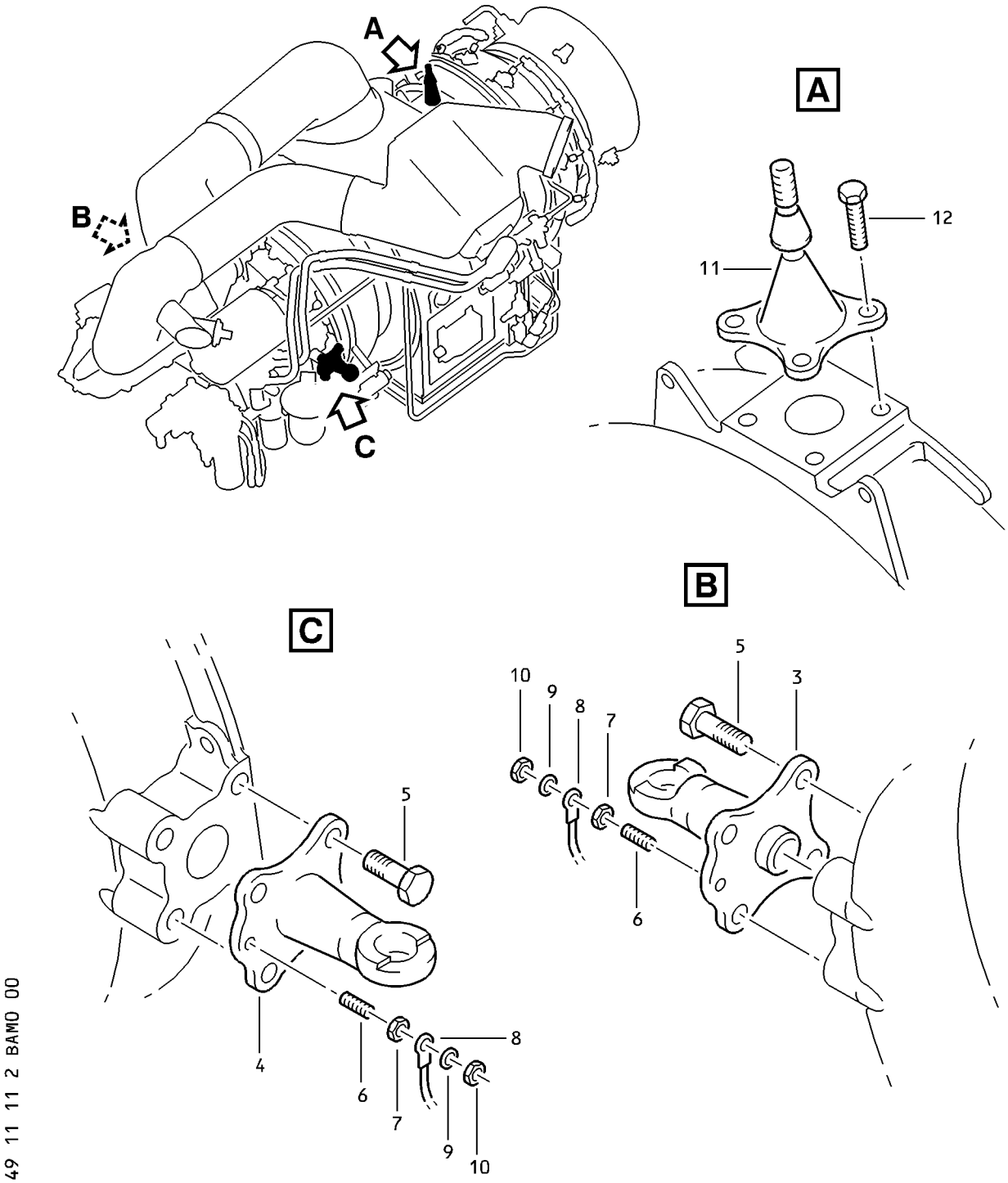
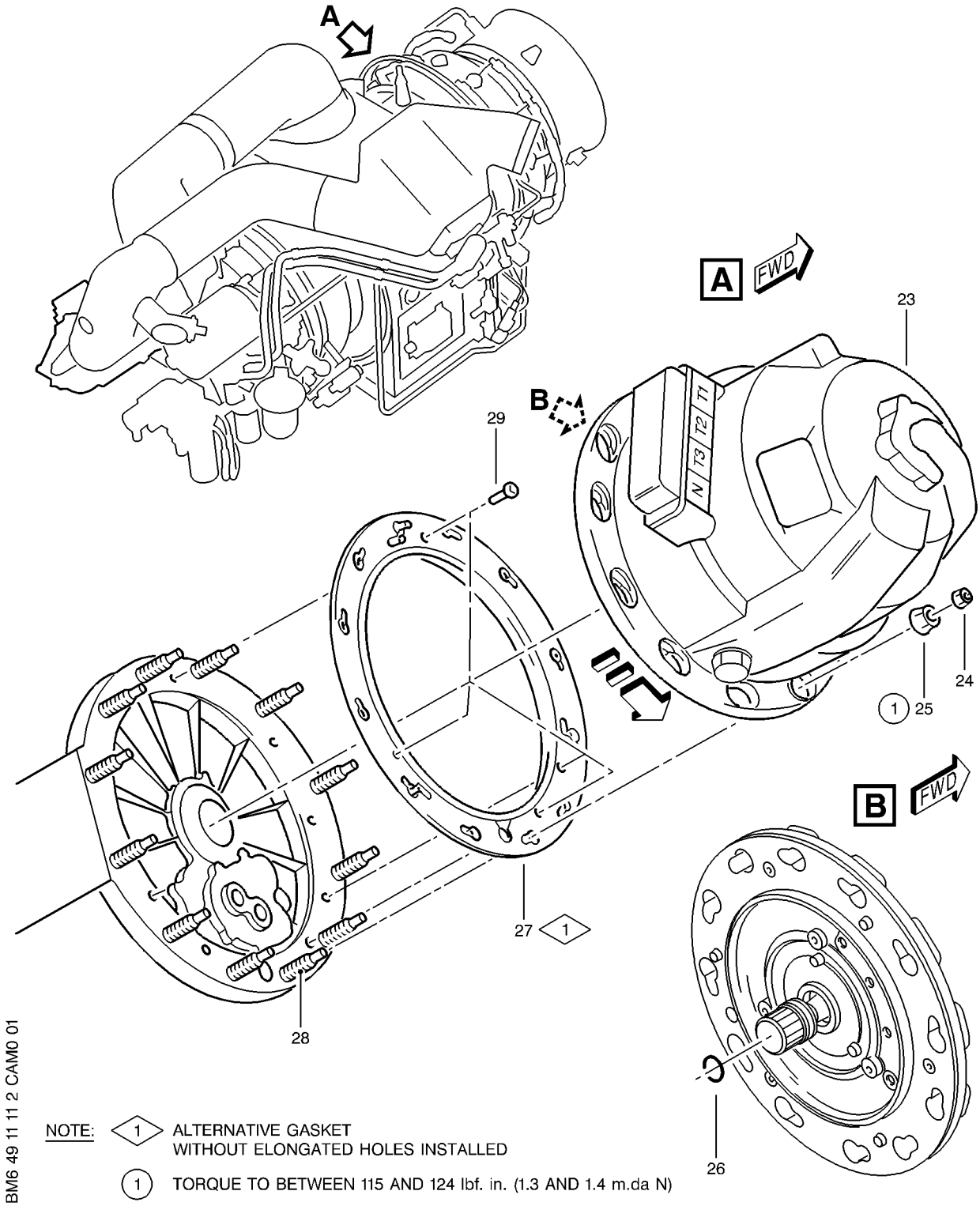
APU on Transport Trolley
Figure 201

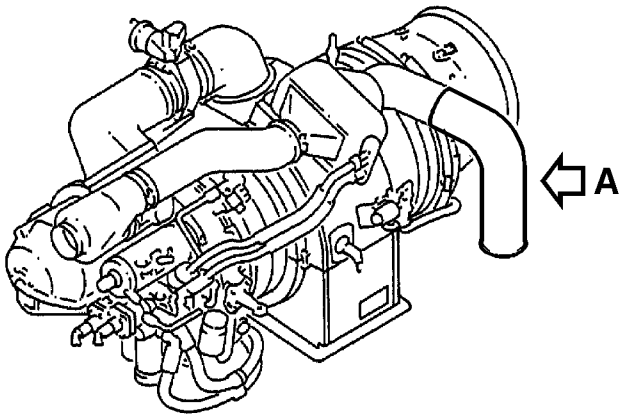


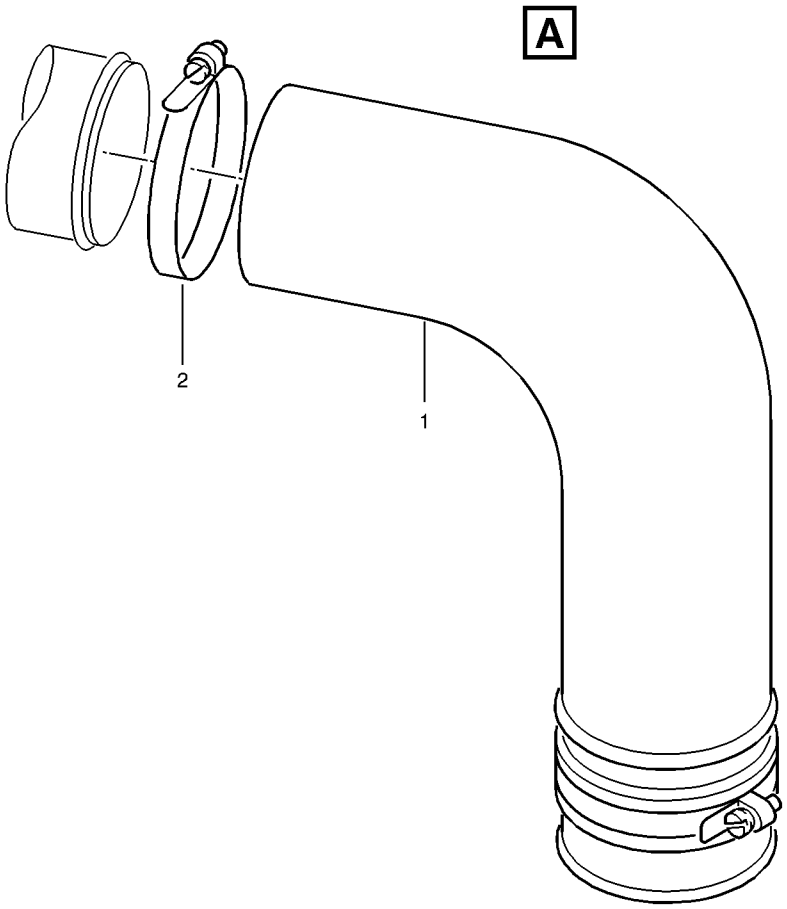
APU Mount Brackets
Figure 202



APU AC Generator
Figure 203

R





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R

Oil Cooler Bellows
Figure 204

(e)Safety the bolts (5) with the lockwire (Material No. 19-010).
(f)Install one setscrew (6) at each of the FWD APU mount-brackets (3) and (4).
(g)Safety each setscrew (6) in position with a nut (7).
R (h)TORQUE the nut (7) to between 0.62 and 0.75 m.daN (54.86 and
R 66.37 lbf.in.).
(j)Remove any contamination from the contact areas of the bonding strap (8).
(k)Install a bonding strap (8), with a washer (9) and a nut (10), on each setscrew (6).
R (l)TORQUE the nut (10) to between 0.75 and 0.90 m.daN (66.37 and
R 79.64 lbf.in.).
R (m)Apply paint (Material No. 07-020) to the bolts (5).
R (n)Put the top mount bracket (11) in position on the top mount pad.
(p)Install the bolts (12) at the top mount bracket (11).
R (q)TORQUE the bolts (12) to between 2.6 and 3.0 m.daN (230 and
R 265 lbf.in.).
R (r)Safety the bolts (12) with the lockwire (Material No. 19-010).
R (s)Apply paint (Material No. 07-020) to the bolts (12).

(2)Installation of the APU AC Generator (Ref. Fig. 203).

WARNING: THE APU AC GENERATOR WEIGHS APPROXIMATELY 28KG (61.7 LB.)

(a)Remove blanking caps and plugs from APU AC generator (23) and gearbox apertures.
(b)Apply oil (Mat. No. 03-002 or 03-003) thinly to APU AC generator splined shaft and new O-ring (26).
(c)Install new O-ring (26).
(d)Put the seal plate (27) on the flange of the APU generator (23) and install the screws (29).
(e)Loosely install the nuts (24) and (25) on the studs (28).
(f)Lubricate the splined shaft of the APU generator (23) with oil (Material No. 03-002 or 03-003).
(g)Put the APU AC generator (23) on the nuts (25) and turn it counter clockwise to engage the slots.
(h)Tighten the nuts (25) in a diametrically opposite sequence.
(j)TORQUE the nuts (25) to between 1.3 and 1.4 m.daN (115 and 124 lbf.in).
(k)Tighten nuts (24).
(4)Installation of the Oil Cooler Bellows (Ref. Fig. 204).
(a)Install bellows (1) on oil cooler outlet and secure with clamp (2).

C. Close-up
(1)The APU is now ready for installation (Ref. 49-10-00, P. Block 401).

APU MOUNTS - DESCRIPTION AND OPERATION

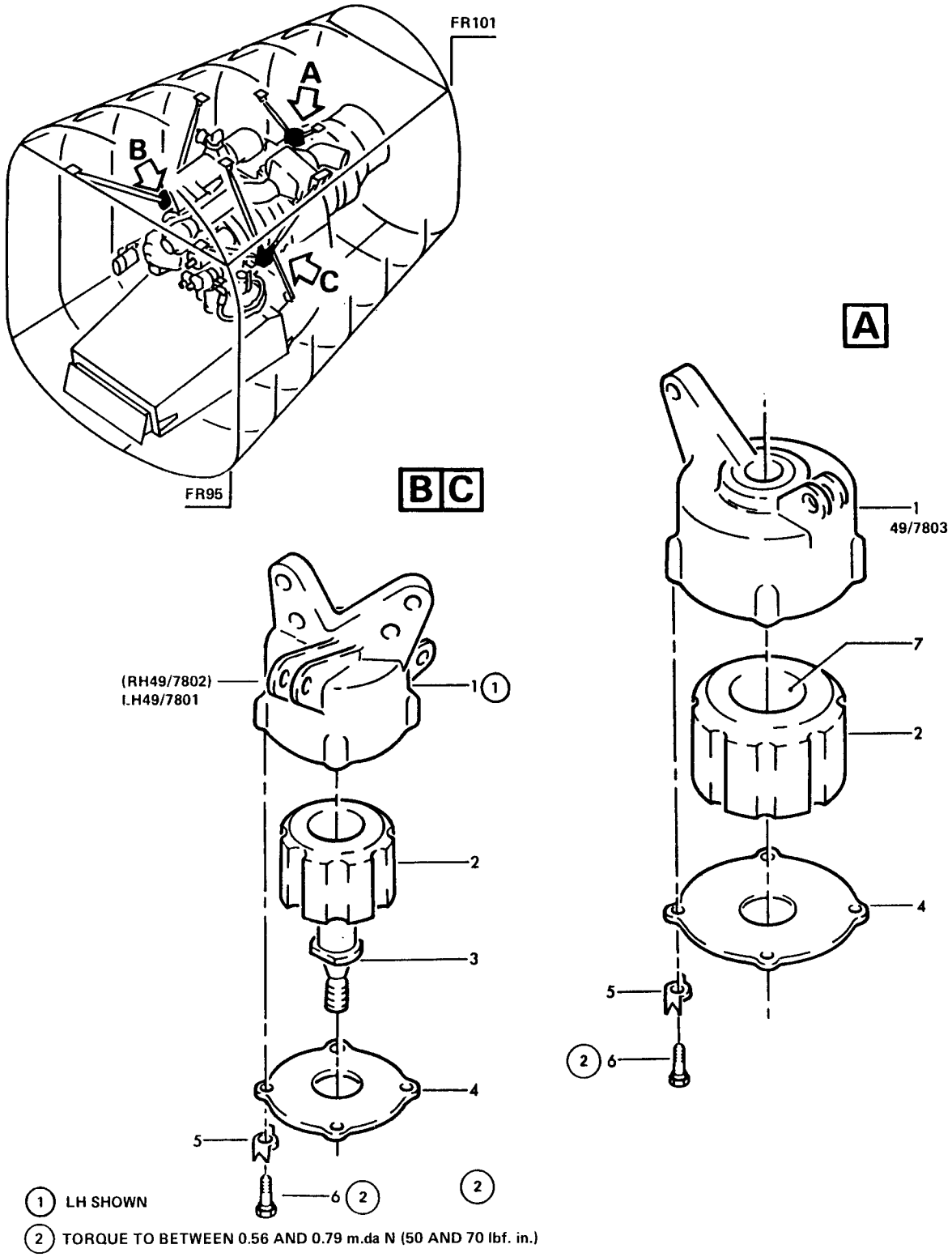
1. General

The APU is suspended at three points by tie-rods. In order to protect the structure and the APU against vibration. Shock mounts are provided between the tie-rods and the APU. The three APU mounts are attached to the APU compartment at FR95, FR98 and FR99.

2. Component Location

(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
49/7803	AFT APU MOUNT		315	316AR	49-12-00
			316	316AR	
49/7801	LH FWD APU MOUNT		315	315AL	49-12-00
			316	316AR	
49/7802	RH FWD APU MOUNT		315	315AL	49-12-00
			316	316AR	
49/7806	AFT BRACKET		315	315AL	49-12-00
			316	316AR	
49/7804	LH FWD BRACKET		315	315AL	49-12-00
			316	316AR	
49/7805	RH FWD BRACKET		316	315AL	49-12-00
			316	316AR	



APU Mounts - Component Location
Figure 001

3. Description

(Ref. Fig. 002)

The suspension system is a failsafe design, so that a failure of any single rod will not result in a suspension failure. The three shock mounts are designed according to the safelife principle. The entire system layout fulfills the fireproof requirements.

The shock mount comprises two main parts, the housing and the bonding member. The housing is made of steel and is designed with fork and eye attachments to connect the tie-rods. The bonding member acts as a vibration and shock damper and is made of silicone elastomer compound. The tie-rods are connected between the shock mounts and structural brackets on the compartment ceiling. The tie-rods are adjustable to locate the APU in the installation position.

The APU brackets are attached by a recessed flange fitting. The LH and RH FWD brackets are provided with an extension that accepts the shock mount cone bolts; a cone bolt is integral with the AFT bracket.

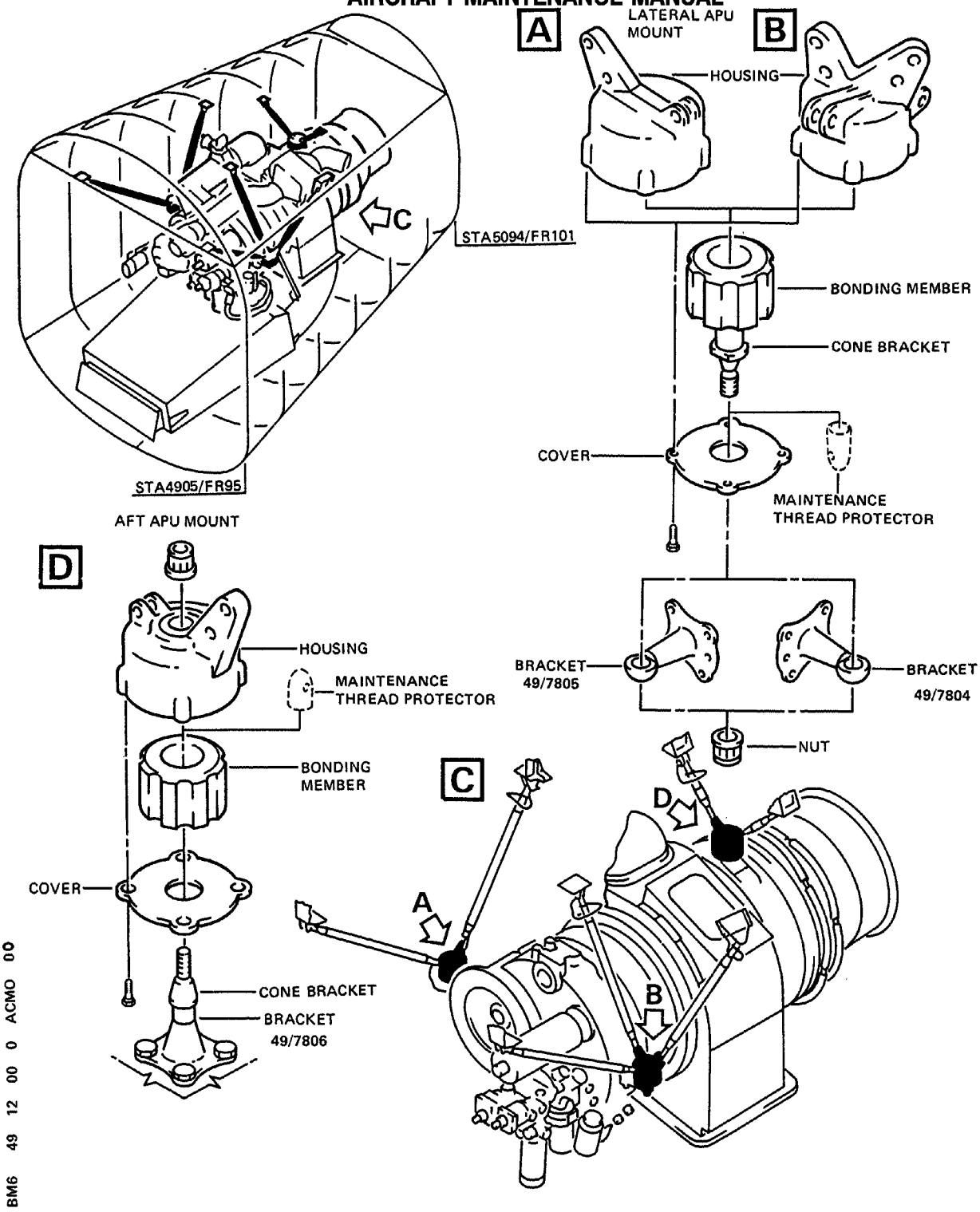
The tie-rod mounting fittings on the upper fire wall are steel or titanium and designed for a load transfer to the supporting structure and also for a reduction of heat transfer in the event of a fire.

For the inspection of these mounting fittings, which are between APU compartment and the outer skin, panels are provided.

All the other suspension components are easily accessible for maintenance and inspection.

All suspension components, except the elastomer elements in the shock mounts, are manufactured from steel and are designed to 'ON CONDITION' principle to withstand the stresses of an APU compartment fire, as well as the normal operation loads. In case of fire, the elastomer may be damaged. A separation of FWD cone bolt or AFT bracket is impossible, as the outer diameter of the bonding member steel core is larger than the bore of the housing cover. Due to their flexibility, all APU interfaces (fuel, air, inlet, exhaust, bleed air, drains, electrical harnesses) allow an APU movement of max. 10 mm (.394 in.) so that there is no additional danger.

The front suspensions are connected to APU and structure by bonding straps. The rear suspension is bonded only to the structure.



APU Mount Build-Up
Figure 002

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : WITH APU INSTALLED, ONLY ONE MOUNT MAY BE EXCHANGED AT A TIME. APU MUST BE SUSPENDED FROM A MINIMUM OF ANY TWO MOUNTS COMBINED WITH APU HOIST.

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

WARNING : MISUSE OF HOIST P/N M025B01 AND HOIST P/N M026B002 IS DANGEROUS AND CAN CAUSE SERIOUS INJURY.
- MAKE CERTAIN THAT THE GEAR SELECTOR IS ENGAGED CORRECTLY AND IS NOT IN THE NEUTRAL POSITION.
- DO NOT CHANGE THE GEAR SELECTION WHEN RAISING OR LOWERING THE LOAD AS THIS WILL ALLOW THE LOAD TO FALL RAPIDLY, OUT OF CONTROL.
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING AND LEAVE AT LEAST ONE COMPLETE TURN ON THE DRUM, THIS WILL PREVENT DAMAGE TO THE CABLE.

WARNING : WHEN USING HOIST P/N M025B003 OR M026B004 OR M027H004 THE FOLLOWING PRECTIONS MUST BE OBSERVED:
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING.
- MAKE CERTAIN THAT YOU DO NOT UNWIND THE CABLE BEYOND THE RED MARK, THIS WILL PREVENT DAMAGE TO THE CABLE.

WARNING : MAKE CERTAIN THAT THE CABLE IS NOT KINKED OR TWISTED. KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

1. Equipment and Materials

	ITEM	DESIGNATION
	A.	Access Platform, 6 m (20 ft.)
	B.	Torque Wrench, up to 200 lbf.in. (2 m.daN)
	C.	Torque Wrench, up to 500 lbf.in. (5 m.daN)
	D.	Torque Wrench, up to 1300 lbf.in. (15 m.daN)
R	E. 91/541	Hoist - Minilift
	or	
	A2-43-1091	Hoist - Minilift
	or	
	ALKAN P/N M025B01	Mechanical Hoisting System
	or	
	ALKAN P/N M026B002	Mechanical Hoisting System
	ALKAN P/N M025B003	Mechanical Hoisting System
	or	
	ALKAN P/N M026B004	Mechanical Hoisting System
	or	
	ALKAN P/N M027H004	Mechanical Hoisting System
	F. 98A49107504001	Protector - Thread, APU Mounting Bolts

G. Material No. 05-027	Special Materials (Ref. 20-31-00)

Referenced Procedures

- 20-28-11, P. Block 1	Electrical Bonding
- 49-10-00, P. Block 401	Power Plant
- 49-12-00, P. Block 601	APU Mounts
- 49-16-14, P. Block 401	Inlet Duct
- 49-52-14, P. Block 401	Oil Cooler Outlet Duct
- 51-75-10, P. Block 801	Repair of Paint Coatings
- 52-41-21, P. Block 401	APU Access Doors

2. Procedure

CAUTION : WITH APU INSTALLED, ONLY ONE MOUNT MAY BE EXCHANGED AT A TIME. APU MUST BE SUSPENDED FROM A MINIMUM OF ANY TWO MOUNTS COMBINED WITH APU HOIST.

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform.

(3)Open access doors 315AL and 316AR.

NOTE : Removal of access doors 315AL and 316AR (Ref. 52-41-21, P. Block 401) avoids obstruction of working area on access platform.

(4)Remove oil cooler outlet duct (Ref. 49-52-14, P. Block 401).

(5)Remove inlet duct (Ref. 49-16-14, P. Block 401).

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

R

WARNING : MISUSE OF HOIST P/N M025B01 AND HOIST P/N M026B002 IS DANGEROUS AND CAN CAUSE SERIOUS INJURY.
- MAKE CERTAIN THAT THE GEAR SELECTOR IS ENGAGED CORRECTLY AND IS NOT IN THE NEUTRAL POSITION.
- DO NOT CHANGE THE GEAR SELECTION WHEN RAISING OR LOWERING THE LOAD AS THIS WILL ALLOW THE LOAD TO FALL RAPIDLY, OUT OF CONTROL.
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING AND LEAVE AT LEAST ONE COMPLETE TURN ON THE DRUM, THIS WILL PREVENT DAMAGE TO THE CABLE.

R

WARNING : WHEN USING HOIST P/N M025B003 OR M026B004 OR M027H004 THE FOLLOWING PRECAUTIONS MUST BE OBSERVED:
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING.
- MAKE CERTAIN THAT YOU DO NOT UNWIND THE CABLE BEYOND THE RED MARK, THIS WILL PREVENT DAMAGE TO THE CABLE.

R

WARNING : MAKE CERTAIN THAT THE CABLE IS NOT KINKED OR TWISTED. KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

(6)Install spreader bar and hoist (Ref. 49-10-00, P. Block 401).
(7)Apply tension to hoist cable.

B. Removal

NOTE : For removal/installation of APU mounts (8, 14, 15), tie-rods have to be disconnected on APU mount end only.

(1)Remove LH forward shockmount (14).
(Ref. Fig. 401)
(a)Remove nut (9), bolt (8) and remove inlet duct tie-rod (10).
(b)Remove nuts (3), washers (19) and bolts (4) to disconnect bonding straps (5, 13, 16, 18).
(c)Remove nut (12) and fit thread protector.
(d)Remove nuts (2), bolts (1, 7) and tie-rods (6, 15, 17).
(e)Remove shockmount (14).

(2)Remove RH forward shockmount (15).
(Ref. Fig. 402)
(a)Remove nuts (3), washers (21), and bolts (1) to disconnect bonding straps (10, 12, 18).
(b)Remove nut (13) and fit thread protector.
(c)Remove nuts (2), bolts (5, 16) and tie-rods (11, 17).
(d)Remove shockmount (15).

(3)Remove aft shockmount (8).
(a)Remove nuts (3) washers (21), and bolts (1) to disconnect bonding straps (4, 20).
(b)Remove nut (7) and fit thread protector.
(c)Remove nuts (2), bolts (5, 16) and tie-rods (6, 19).
(d)Remove shockmount (8).

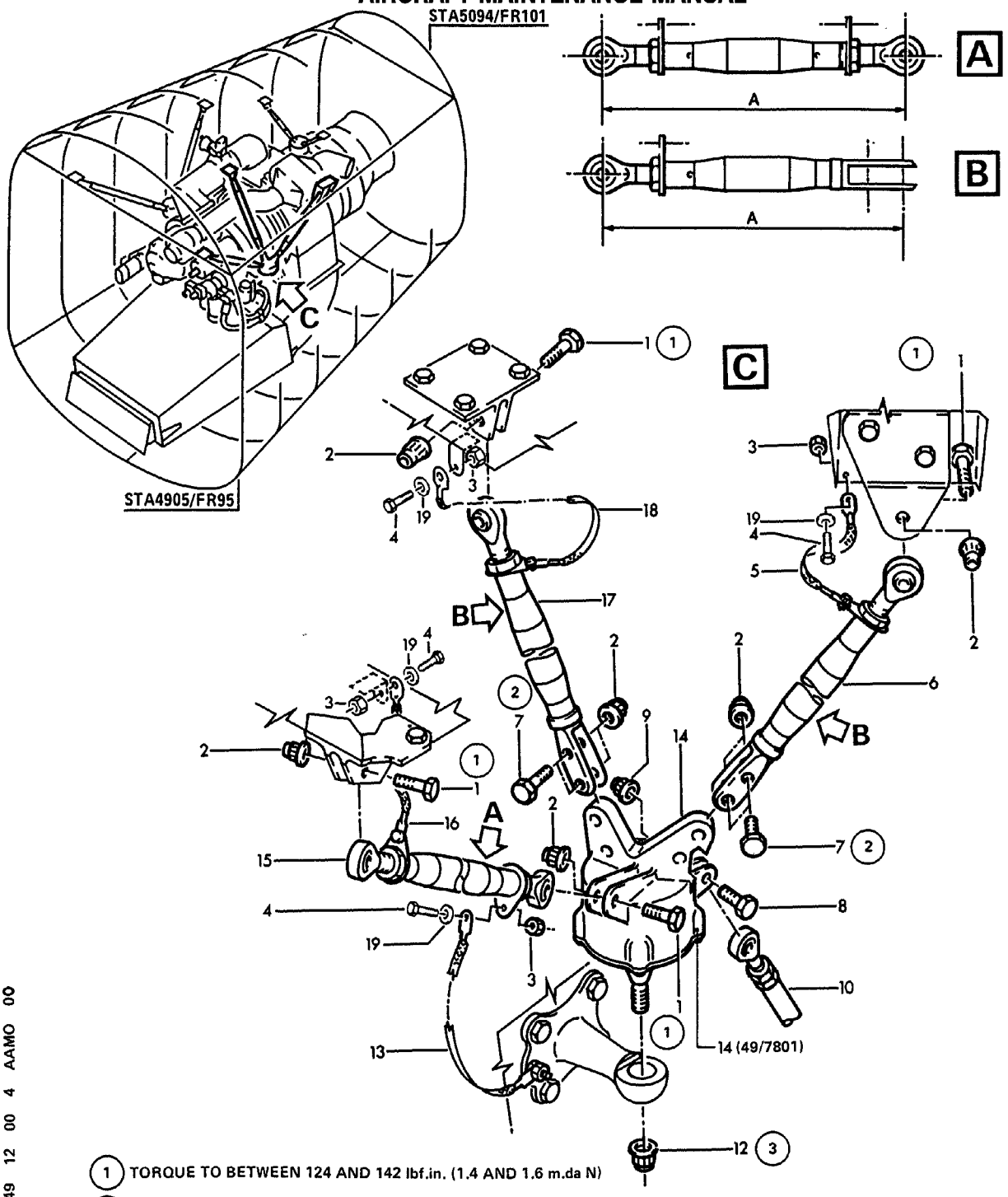
C. Preparation for Installation

(1)Visually inspect tie-rods for damage, chafing, corrosion, scratches and cracks. Carry out dye penetrant crack detection test, if necessary. Replace tie-rods as necessary.
NOTE : Adjust replaced tie-rods before installation. For tie-rod length refer to Table 401.

TIE-ROD	ITEM	MEASURE 'A' ± 0.8 mm (± 0.032 in.)
LH Forward Suspension		
Lateral tie-rod	(17)	492.8 mm (19.40 in.)
AFT tie-rod	(6)	441.0 mm (17.36 in.)
FWD tie-rod	(15)	792.6 mm (31.20 in.)
RH Forward Suspension		
FWD tie-rod	(11)	771.5 mm (30.37 in.)
AFT tie-rod	(17)	512.2 mm (20.17 in.)
AFT Suspension		
RH tie-rod	(6)	200.1 mm (7.88 in.)
LH tie-rod	(19)	198.1 mm (7.80 in.)

NOTE : For LH forward suspension (Ref. Fig. 401).
For RH forward suspension and aft suspension (Ref. Fig. 402).

Table 401



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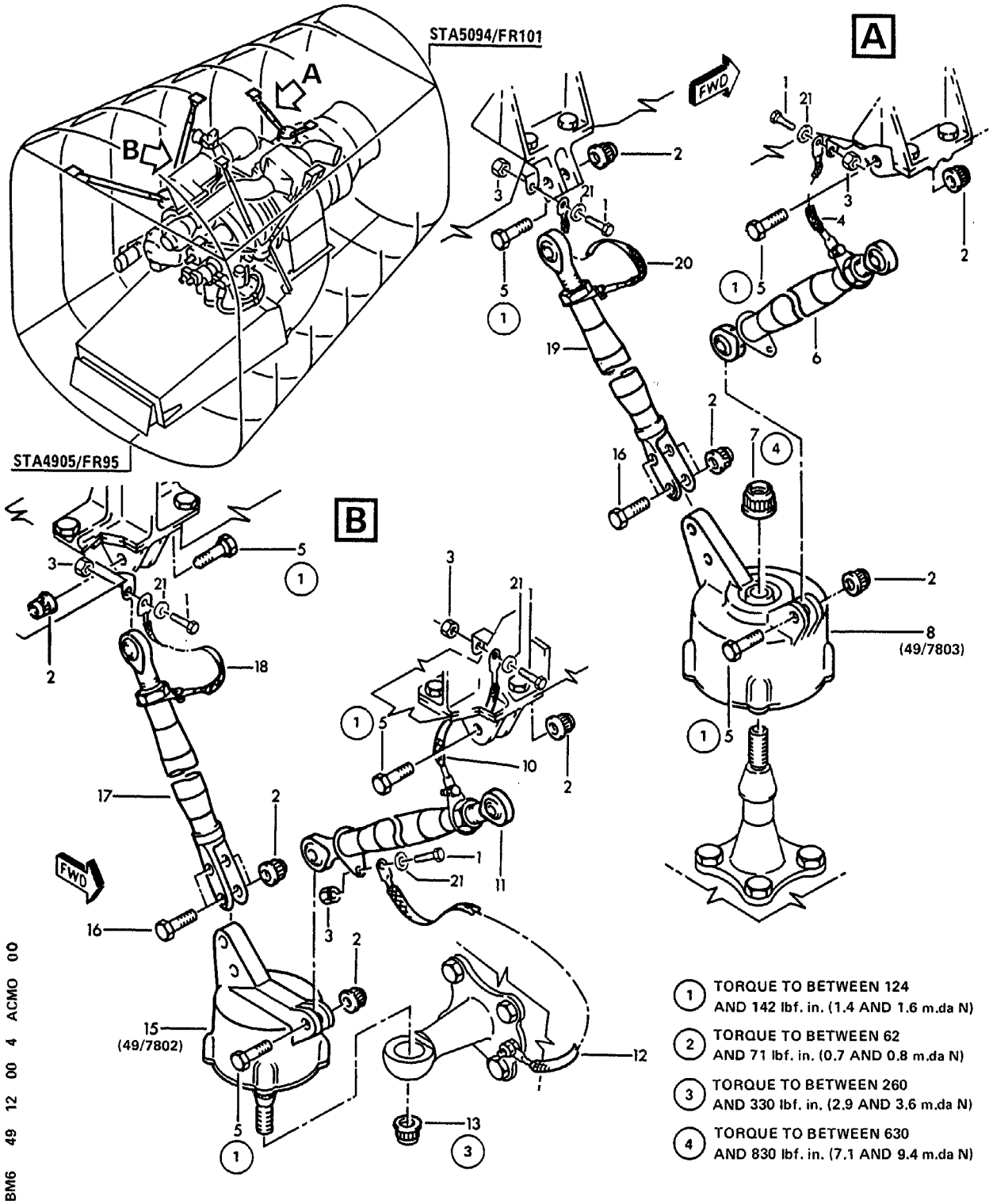
(1) TORQUE TO BETWEEN 124 AND 142 lbf.in. (1.4 AND 1.6 m.da N)

(2) TORQUE TO BETWEEN 62 AND 71 lbf.in. (0.7 AND 0.8 m.da N)

(3) TORQUE TO BETWEEN 260 AND 330 lbf.in. (2.9 AND 3.6 m.da N)

APU LH Forward Shockmount
Figure 401


STA5094/FR101
STA4905/FR95
A
B
FWD
(49/7803)
(49/7802)
BM6 49 12 00 4 ACMO 00
1 TORQUE TO BETWEEN 124 AND 142 lbf. in. (1.4 AND 1.6 m.da N)
2 TORQUE TO BETWEEN 62 AND 71 lbf. in. (0.7 AND 0.8 m.da N)
3 TORQUE TO BETWEEN 260 AND 330 lbf. in. (2.9 AND 3.6 m.da N)
4 TORQUE TO BETWEEN 630 AND 830 lbf. in. (7.1 AND 9.4 m.da N)

APU RH Forward and Aft Shockmount
Figure 402

(2)After adjustment, align eye-end fittings, tighten locknuts and safety with lockwashers.
(3)Inspect APU suspension structural brackets for damage.
(4)Visually inspect APU shockmounts for damage and corrosion (Ref. 49-12-00, P. Block 601). Replace if necessary.

D. Installation
(1)Install LH forward shock mount (14).
(Ref. Fig. 401)
(a)Position shockmount (14) and install tie-rods (6, 15, 17) with bolts (1, 7) and nuts (2).
(b)TORQUE bolts (1) to between 124 lbf.in. and 142 lbf.in. (1.4 m.daN and 1.6 m.daN).
(c)TORQUE bolts (7) to between 62 lbf.in. and 71 lbf.in. (0.7 m.daN and 0.8 m.daN).
(d)Remove thread protector and install nut (12).
(e)TORQUE nut (12) to between 260 lbf.in. and 330 lbf.in. (2.9 m.daN and 3.6 m.daN).
(f)Install bolts (4), washers (19), bonding straps (5, 13, 16, 18) and nuts (3). For electrical bonding refer to 20-28-11, P. Block 1
(g)Install inlet duct tie-rod (10) with bolt (8) and nut (9).
(2)Install RH forward shockmount (15).
(Ref. Fig. 402)
(a)Position shockmount (15) and install tie-rods (11, 17) with bolts (5, 16) and nuts (2).
(b)TORQUE bolts (5) to between 124 lbf.in. and 142 lbf.in. (1.4 m.daN and 1.6 m.daN).
(c)TORQUE bolts (16) to between 62 lbf.in. and 71 lbf.in. (0.7 m.daN and 0.8 m.daN).
(d)Remove thread protector and install nut (13).
(e)TORQUE nut (13) to between 260 lbf.in. and 330 lbf.in. (2.9 m.daN and 3.6 m.daN).
(f)Install bolts (1), washers (21), bonding straps (10, 12, 18) and nuts (3). For electrical bonding refer to 20-28-11, P. Block 1.
(3)Install aft shockmount (8).
(a)Position shockmount (8) and install tie-rods (6, 19) with bolts (5, 16) and nuts (2).
(b)TORQUE bolts (5) to between 124 lbf.in. and 142 lbf.in. (1.4 m.daN and 1.6 m.daN).
(c)TORQUE bolts (16) to between 62 lbf.in. and 71 lbf.in. (0.7 m.daN and 0.8 m.daN).
(d)Remove thread protector and install nut (7).
(e)TORQUE nut (7) to between 630 lbf.in. and 830 lbf.in. (7.1 m.daN and 9.4 m.daN.)
(f)Install bolts (1), washer (21), bonding straps (4, 20) and nuts (3). For electrical bonding refer to 20-28-11, P. Block 1.

E. Close-Up
(1)Remove hoist and hoist adapter (Ref. 49-10-00, P. Block 401).
(2)Install oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
(3)Install inlet duct (Ref. 49-16-14, P. Block 401).
(4)Apply special material (Mat. No. 05-027) thinly to shockmounts, tie-rod ends and suspension structural brackets (Ref. 51-75-10, P. Block 801).
(5)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(6)Install access doors 315AL and 316AR (Ref. 52-41-21, P. Block 401), if removed.
(7)Close access doors 315AL and 316AR and remove access platform.
(8)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Lockwashers
D.	Torque Wrench, up to 88.5 lbf.in. (up to 1m.daN)
E. Material No. 05-027	Special Materials (Ref. 20-31-00)

Referenced Procedure	
- 49-12-00, P. Block 401	APU Mounts

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

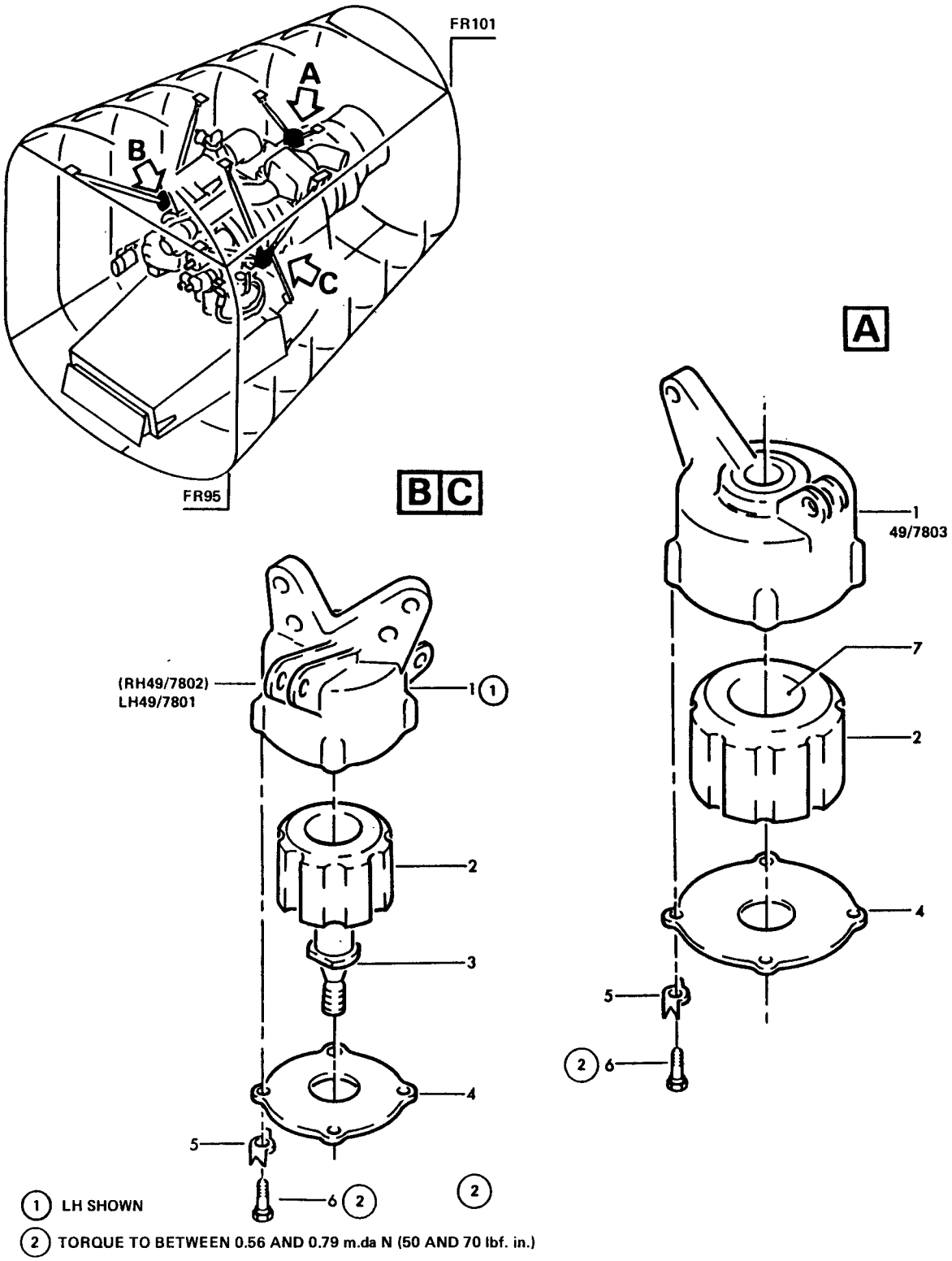
B. Inspection
(Ref. Fig. 601)
(1)Carry out a detailed visual inspection of the tie-rods and associated structure and brackets for damage. Carry out a dye penetrant check on any damage that is suspect. Dissasemble the components only if required.

(2)Carry out a detailed visual inspection of the shockmounts for damage. Carry out a dye penetrant check on any damage that is suspect. Dissasemble the components only if required.

NOTE : If you find any damage at the shockmounts, replace the shockmount completely (Ref. 49-12-00, P. Block 401).

(3)Dissassembling of shockmounts

CAUTION : WITH APU INSTALLED, ONLY ONE MOUNT MAY BE REMOVED AT A TIME. APU MUST BE SUSPENDED FROM A MINIMUM OF ANY TWO MOUNTS AND APU HOIST.



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APU Shockmounts
Figure 601

R

(a)Remove shockmount (Ref. 49-12-00, P. Block 401).
(b)Open tabs of lockwashers (5) and remove bolts (6), coverplate (4) and bonding member (2). Discard lockwashers (5).
(c)Inspect shockmount housing (1) and coverplate (4) for damage. Carry out dye penetrant check if necessary.
(d)For LH and RH bonding members:
Inspect bonding member (2) for splits and deterioration.
Inspect cones and threads for nicks, burrs and marrings caused by seizure, crushing and fretting. Cone surfaces must be clean and dry.
(e)For AFT bonding member:
Inspect bonding member (2) for splits and deterioration.
Inspect taper bushing for nicks, burrs and marrings caused by seizure crushing and fretting. Taper bushing surface must be clean and dry.
(4)If any part of the shockmount is damaged, replace the shockmount completely.
(5)Assembly of shockmounts.
(a)Install bonding member (2) into housing (1) position cover plate (4) lockwashers (5) and secure with bolts (6).
(b)TORQUE bolts to between 0.56 and 0.79 m.daN. (50 and 70 lbf.in.).
(c)Bend tabs of lockwashers to secure bolts.
(6)Install shockmount (Ref. 49-12-00, P. Block 401).
(7)Inspect APU mounts for corrosion protection. If necessary, apply special material (Mat. No. 05-027) to shockmounts, tie-rod ends and suspension brackets.

C. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD and 71KD.

1. Visual Check of APU Suspension System Including Shockmount Structure and Brackets

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

A. Reason for the Job

VISUAL CHECK OF APU SUSPENSION SYSTEM INCLUIDING SHOCKMOUNT STRUCTURE AND BRACKETS

B. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 7 m (23 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Source of White Light
D.	Warning Notice

Referenced Procedure

- 24-41-00, P. Block 301	AC External Power Control
- 24-42-00, P. Block 301	Ground Service Bus Control
- 29-10-00, P. Block 301	Main Hydraulic Power - Pressurization/ Depressurization
- 49-00-00, P. Block 701	Airborne Auxiliary Power
- 52-41-21, P. Block 401	APU Access Doors

C. Job Set-Up

(1)Put a warning notice in the cockpit to tell persons not to start the APU.

(2)Energize the aircraft electrical network (Ref. AMM 24-41-00, P. Block 301).

(3)Make sure that the hydraulic systems are depressurized (Ref. AMM 29-10-00, P. Block 301).

(4)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU		APU/START 50KA	B54
131VU		APU/ECB SUPPLY/MAIN 1KD	B57

(5)Position access platform.

(6)Open access doors 315AL and 316AR.

NOTE: Removal of access doors 315AL and 316AR (Ref. AMM 52-41-21, P. Block 401) avoids obstruction of working area on access platform.

D. Procedure

(Ref. Fig. 602)

(1)Clean the component interface and/or the adjacent area (Ref. AMM 49-00-00, P. Block 701).

(2)Do a visual inspection of the APU mount brackets.

(a)Examine the APU mounts brackets for damage (cracks, wear, scratches) and corrosion under a source of white light.

1_ If you find that they are not in correct condition, replace them (Ref. AMM 49-12-14, P. Block 401).

2_Make sure that the bolts of the APU mount brackets are safetied with their lockwashers and that they are in correct condition.

3_ Make sure that the nuts that attach the shockmounts to the APU mount brackets are in correct condition.

(3)Examine the APU mounts.

(a)Examine the metallic parts of the APU mounts for damage (cracks, wear scratches) and corrosion under a source of white light.

1_If you find that they are not in correct condition, replace the APU mounts (Ref. AMM 49-12-00, P. Block 401).

2_If you finde any external sign of inner damage of elastomeric components, such as elastomeric dust in the area, or metallic marks

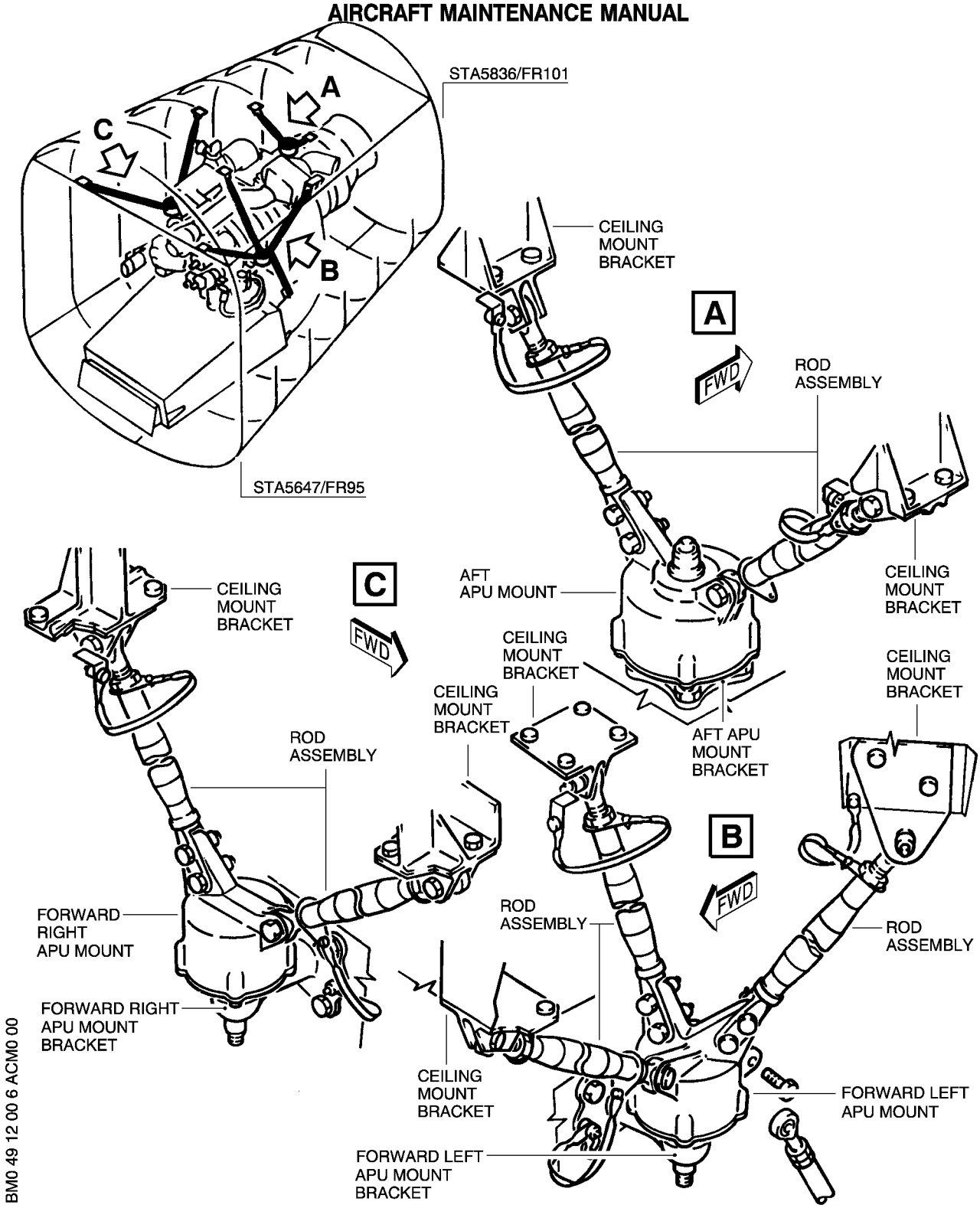
in the area of any maintenance thread protector, replace the three APU mounts (Ref. AMM 49-12-00, P. Block 401).

(4)Do a visual inspection of the ceiling (upper) mount brackets.
(a)Examine the ceiling mount brackets for damage (cracks, wear, scratches) under a source of white light.
(b)Make sure that the mount brackets are correctly attached to the ceiling.

(5)Do a visual inspection of the tie-rods assemblies and the connections including the bonding straps.
(a)Examine the tie-rods assemblies and the connections for damage (cracks, wear, scratches, nicks) and corrosion under a source of white light.
(b)Make sure that the tie-rod assemblies and the connections are not bend.
(c)Examine the bonding straps for correct connection and condition.
(d)Make sure that the nuts and bolts are in correct condition (no signs of corrosion or wear).
(e)If you find that a component is not in the correct condition, replace it (Ref. AMM 49-12-00, P. Block 401).

E. Close-Up

(1)Make sure that the working area is clean and clear of tools and miscellaneous item of equipment.
(2)Install access doors 315AL and 316AR (Ref. AMM 52-41-21, P. Block 401), if removed.
(3)Close access doors 315AL and 316AR and remove access platform.
(4)Remove safety clips and tags and close circuit breakers: 50KA, 1KD, 58KD and 71KD.
(5)De-energize the ground service network (Ref. AMM Task 24-42-00 P. Block 301).
(6)Remove warning notice(s).



APU Mount Inspection
Figure 602

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002.
THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
USE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

R
WARNING : MISUSE OF HOIST P/N M025B01 AND HOIST P/N M026B002 IS DANGEROUS AND CAN CAUSE SERIOUS INJURY.
- MAKE CERTAIN THAT THE GEAR SELECTOR IS ENGAGED CORRECTLY AND IS NOT IN THE NEUTRAL POSITION.
- DO NOT CHANGE THE GEAR SELECTION WHEN RAISING OR LOWERING THE LOAD AS THIS WILL ALLOW THE LOAD TO FALL RAPIDLY, OUT OF CONTROL.
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING AND LEAVE AT LEAST ONE COMPLETE TURN ON THE DRUM, THIS WILL PREVENT DAMAGE TO THE CABLE.

R
WARNING : WHEN USING HOIST P/N M025B003 OR M026B004 THE FOLLOWING PRECAUTIONS MUST BE OBSERVED:
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING.
- MAKE CERTAIN THAT YOU DO NOT UNWIND THE CABLE BEYOND THE RED MARK, THIS WILL PREVENT DAMAGE TO THE CABLE.

R
WARNING : MAKE CERTAIN THAT THE CABLE IS NOT KINKED OR TWISTED.
KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

CAUTION : WITH APU INSTALLED, ONLY ONE MOUNT BRACKET MAY BE EXCHANGED AT A TIME. MAKE CERTAIN THAT APU R/I HOIST IS INSTALLED CORRECTLY AND WEIGHT IS TAKEN FROM APU MOUNTS. TAKE CARE NOT TO DAMAGE STRUCTURAL BRACKETS AND TIE-RODS.

1. Equipment and Materials

	ITEM	DESIGNATION
	A.	Access Platform, 6 m (20 ft.)
	B.	Torque Wrench, up to 500 lbf.in. (5.0 m.daN)
	C.	Strong, White Light
	D.	Magnifying Glass, 10 x
R	E. 91/541	Hoist - Minilift
	or	
	A2-43-1091	Hoist - Minilift
	or	
	ALKAN P/N M025B01	Mechanical Hoisting System
	or	
	ALKAN P/N M026B002	Mechanical Hoisting System
	ALKAN P/N M025B003	Mechanical Hoisting System
	or	
	ALKAN P/N M026B004	Mechanical Hoisting System
	F.	Circuit Breaker Safety Clips and Tags.
	G.	Washers, if required
	H.	Fine, Bronze Wool
	J.	Bristle Brush
	K.	Clean, Lint-Free Cloth
	L.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
	M. Material No. 05-027	Special Materials (Ref. 20-31-00)
	N. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

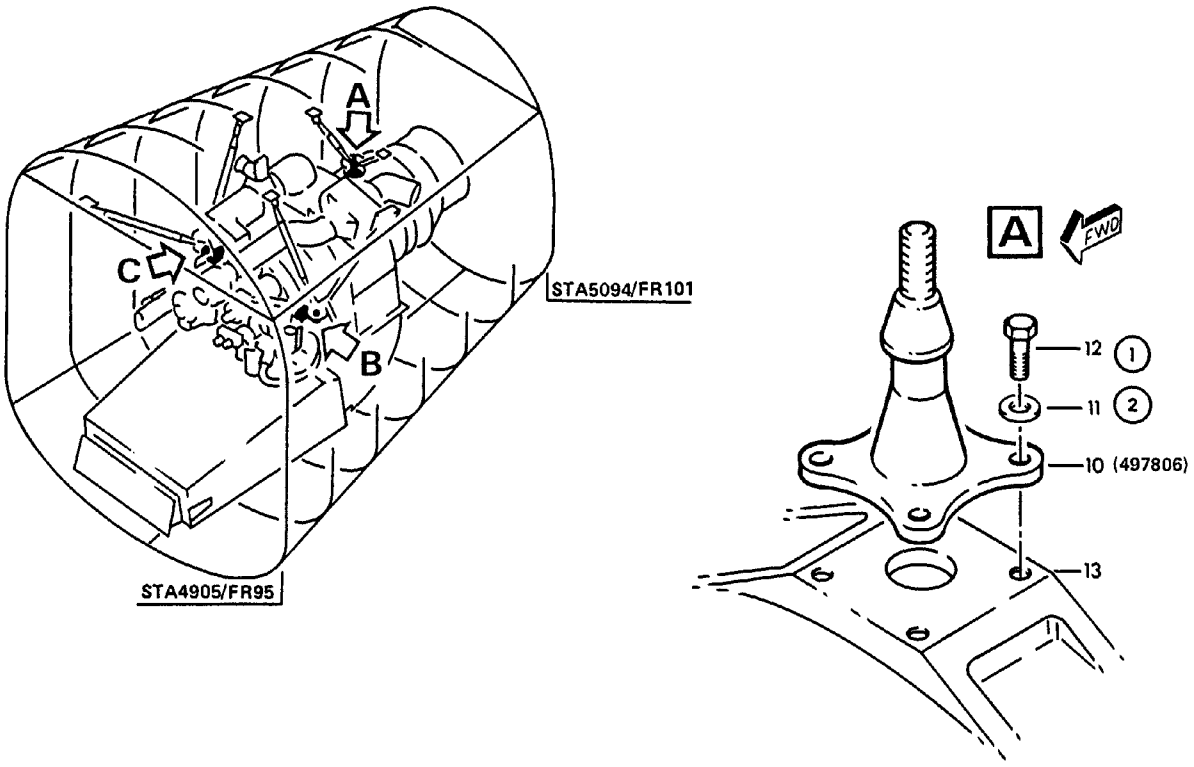
- 20-28-11, P. Block 1	Electrical Bonding
- 49-10-00, P. Block 401	Power Plant
- 49-12-00, P. Block 401	APU Mounts
- 49-16-14, P. Block 401	Inlet Duct
- 49-52-14, P. Block 401	Oil Cooler Outlet Duct
- 51-75-10, P. Block 801	Repair of Paint Coatings
- 52-41-21, P. Block 401	APU Access Doors

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



NOTE: (1) TORQUE 230–265 lbf. in. (2.6–3.0 m.da.N)

(2) WASHERS REQUIRED ONLY IF HOLES OF BRACKETS (2, 10) ARE CHAMFERED

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Mount Bracket
Figure 401

(2)Position access platform.
(3)Open access doors 315AL and 316AR.
NOTE : Removal of access door 315AL (Ref. 52-41-21, P. Block 401) will ease handling of Hoist.
(4)Remove oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
(5)Remove inlet duct (Ref. 49-16-14, P. Block 401).
(6)Install spreader bar and Hoist (Ref. 49-10-00, P. Block 401).

WARNING : APU WEIGHS APPROX. 260 kg (573 lb.).

R

WARNING : MISUSE OF HOIST P/N M025B01 AND HOIST P/N M026B002 IS DANGEROUS AND CAN CAUSE SERIOUS INJURY.
- MAKE CERTAIN THAT THE GEAR SELECTOR IS ENGAGED CORRECTLY AND IS NOT IN THE NEUTRAL POSITION.
- DO NOT CHANGE THE GEAR SELECTION WHEN RAISING OR LOWERING THE LOAD AS THIS WILL ALLOW THE LOAD TO FALL RAPIDLY, OUT OF CONTROL.
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING AND LEAVE AT LEAST ONE COMPLETE TURN ON THE DRUM, THIS WILL PREVENT DAMAGE TO THE CABLE.

R

WARNING : WHEN USING HOIST P/N M025B003 OR M026B004 THE FOLLOWING PRECAUTIONS MUST BE OBSERVED:
- MAKE CERTAIN THAT CABLE IS LOADED WITH A MINIMUM OF 10 daN (22.5 lbf.) WHILE WINDING OR UNWINDING.
- MAKE CERTAIN THAT YOU DO NOT UNWIND THE CABLE BEYOND THE RED MARK, THIS WILL PREVENT DAMAGE TO THE CABLE.

R

WARNING : MAKE CERTAIN THAT THE CABLE IS NOT KINKED OR TWISTED.
KEEP THE CABLE CLEAR OF ANY SHARP OBJECTS THAT CAN DAMAGE IT.

(7)Take weight from APU.

B. Removal of Forward (FWD) Mount Brackets

CAUTION : WITH APU INSTALLED, ONLY ONE MOUNT BRACKET MAY BE EXCHANGED AT A TIME. MAKE CERTAIN THAT HOIST IS INSTALLED CORRECTLY AND WEIGHT IS TAKEN FROM APU MOUNTS. TAKE CARE NOT TO DAMAGE APU MOUNT STRUCTURAL BRACKETS AND TIE-RODS.

(1)Remove corresponding FWD APU shockmount (Ref. 49-12-00, P. Block 401).
(2)Remove nut (9), washer (8) and bonding strap (7).
(3)Loosen locknut (6) and remove setscrew (5).
(4)Cut and remove lockwire from bolts (4).
(5)Support mount bracket (2), remove bolts (4) and if installed washers (3).

NOTE : If bolts (4) are secured by lockwashers, remove and discard bolts (4) and lockwashers.

(6)Remove mount bracket (2) from APU mounting flange (1).

C. Preparation for Installation of FWD Mount Brackets

WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.

(1)Clean mount bracket (2) using Cleaning Agent (Mat. No. 11-002) and bristle-brush.
  (a)Dry mount bracket (2) using clean, lint-free cloth.

CAUTION : USE EXTREME CARE WHEN CLEANING CONICAL AREA USING FINE, BRONZE WOOL.

(2)If crusts are found, remove them using fine bronze wool.
  (a)Clean mount bracket (2), refer to step (1).
(3)Check mount bracket (2), including conical area, for damage, abnormal wear and corrosion using strong, white light and magnifying glass.

NOTE : If damage, abnormal wear or corrosion is found, refer to manufacturer's instructions.

(4)Make certain, that APU mounting flange (1) is clean and free of damage.
  (a)Check that thread inserts of APU mounting flange (1) are serviceable.

D. Installation of FWD Mount Brackets

(1)Position mount bracket (2) onto APU mounting flange (1).

CAUTION : IF HOLES OF MOUNT BRACKET (2) ARE CHAMFERED, WASHERS (3) MUST BE INSTALLED.

NOTE : During installation make certain that interface profiles of mounting bracket flange and APU mounting are matched. Also ensure that the bonding point of the bracket is installed in forward position.

(2)Install bolts (4) and if required washers (3).
(3)TORQUE bolts (4) to between 230 and 265 lbf.in. (2.6 and 3.0 m.daN).
(4)Safety bolts (4) with lockwire.
(5)Install setscrew (5) and tighten lock nut (6).
(6)Install bonding strap (7), washer (8) and nut (9). For electrical bonding refer to 20-28-11, P. Block 1.
(7)Install corresponding FWD shockmount (Ref. 49-12-00, P. Block 401).

E. Removal of AFT Mount Bracket

CAUTION : WITH APU INSTALLED, ONLY ONE MOUNT BRACKET MAY BE EXCHANGED AT A TIME. MAKE CERTAIN THAT HOIST IS INSTALLED CORRECTLY AND WEIGHT IS TAKEN FROM APU MOUNTS. TAKE CARE NOT TO DAMAGE APU MOUNT STRUCTURAL BRACKETS AND TIE-RODS.

(1)Remove AFT APU Shockmount (Ref. 49-12-00, P. Block 401).

(2)Cut and remove lockwire from bolts (12).

(3)Support mount bracket (10), remove bolts (12) and if installed washers (11).

NOTE : If bolts (12) are secured by lockwashers, remove and discard bolts (12) and lockwashers.

(4)Remove mount bracket (10) from APU mounting flange (13).

F. Preparation for Installation of AFT Mount Bracket

WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.

(1)Clean mount bracket (10) using Cleaning Agent (Mat. No. 11-002) and
R stiff bristle-brush.

(a)Dry mount bracket (10) using clean, lint-free cloth.

CAUTION : TAKE EXTREME CARE WHEN CLEANING CONICAL AREA, USE FINE BRONZE WOOL.

(2)If crusts are found, remove them using fine bronze wool.

(a)Clean mount bracket (10), refer to step (1).

(3)Check mount bracket (10), including conical area, and thread for damage, abnormal wear and corrosion using strong, white light and magnifying glass.

NOTE : If damage, abnormal wear or corrosion is found, refer to manufacturer's instructions.

(4)Make certain, that APU mounting flange (13) is clean and free of damage.

(a)Check that thread inserts of APU mounting flange (13) are serviceable.

G. Installation of AFT Mount Bracket

(1)Position mount bracket (10) onto APU mounting flange (13).

CAUTION : IF HOLES OF MOUNT BRACKET (10) ARE CHAMFERED, WASHERS (11) MUST BE INSTALLED.

(2)Install bolts (12) and if required washers (11).

(3)TORQUE bolts (12) to between 230 and 265 lbf.in. (2.6 and 3.0 m.daN).

(4)Safety bolts (12) with lockwire.

(5)Install AFT APU Shockmount (Ref. 49-12-00, P. Block 401).

H. Close-Up
(1)Remove Hoist and spreader bar (Ref. 49-10-00, P. Block 401).
(2)Install inlet duct (Ref. 49-16-14, P. Block 401).
(3)Install access door 315AL (Ref. 52-41-21, P. Block 401), if removed.
(4)Install oil cooler outlet duct (Ref. 49-52-14, P. Block 401).
(5)Thinly apply special material (Mat. No. 05-027) to APU mount brackets (Ref. 51-75-10, P. Block 801).
(6)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(7)Close access doors 315AL and 316AR and remove access platform.
(8)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

FIRE SEALS - DESCRIPTION AND OPERATION

1. General

The APU compartment is designed to fulfill the requirements established for a designated fire zone and is installed as an integral part of the aircraft fuselage.

2. Component Location

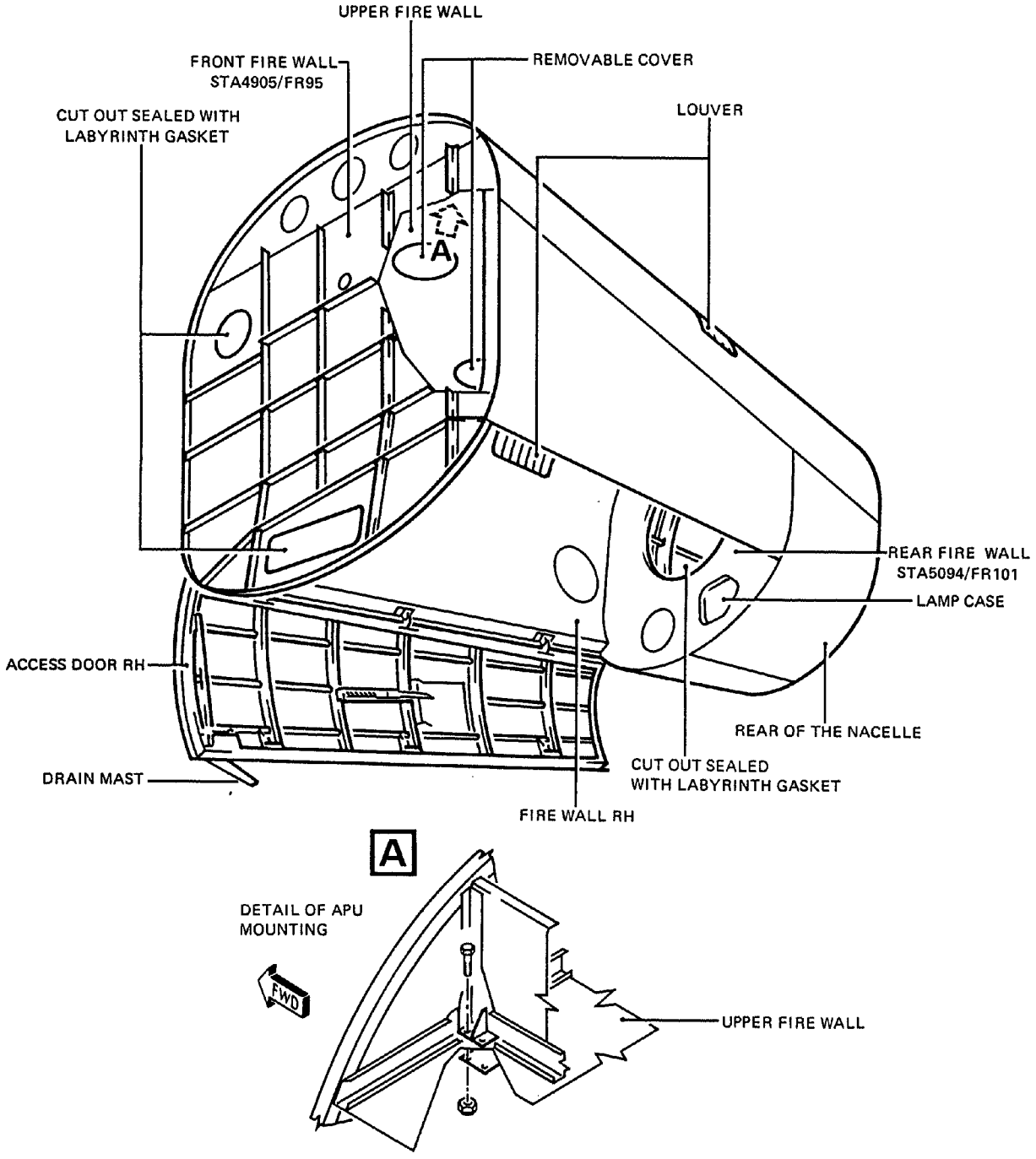
FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	RING FLANGE		315	315AL	49-13-11
			316	316AR	
	PRESSURE RING		317	317AL	49-13-11
			318		
	FIRE SEAL		317	317AL	49-13-11
			318		
	GUIDE SLEEVE		317	317AL	49-13-11
			318		

3. Description

(Ref. Fig. 001, 002)

The APU compartment, located in subsection II, is formed by fire walls on LH and RH side and the upper zone inside the tailcone structure as well as the rear fire wall. The front fire wall is an integral part of FR95. All fire walls are made of titanium. The surface to the rear of the designated fire zone (APU compartment) consists of fire resistant material (light alloy). Due to this design, all supporting structures are shielded to withstand the effects of a fire. Below the shielding, the support brackets are made of stainless steel. For inspection purposes, access covers are provided in the upper fire wall. The compartment is closed by two longitudinally-hinged doors which are fire resistant and also designed as fire walls. These form the lower part of the compartment. Fluids are discharged via a drain mast so as to prevent reingestion. The compartment is sealed with heat-resistant sealing paste to prevent the passage of fluids, vapors or flames to other compartments. The APU compartment is ventilated by two titanium louvers, LH and RH.

Contact areas between titanium and aluminum alloy are protected against corrosion. All openings for fuel lines, air ducts and electrical harnesses through the front fire wall, and the exhaust muffler through the aft fire wall, are sealed by gaskets to provide fireproof sealing.



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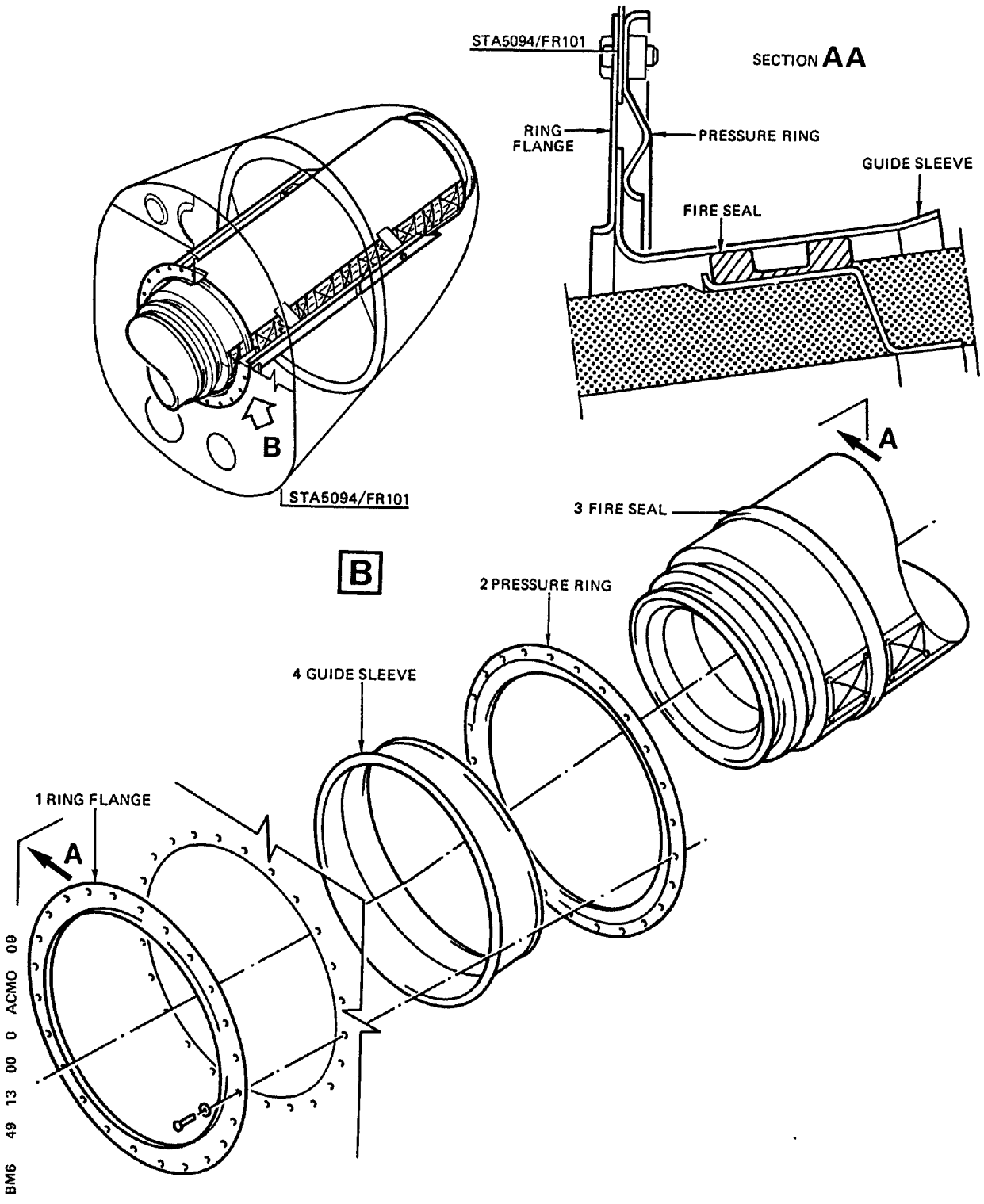
Tailcone Structure
Figure 001



Fire Seal
Figure 002

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Reason for the Job

R General visual inspection of fire walls and compartment doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 7 m (23 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Warning Notice

Referenced Procedure

- 24-41-00, P. Block 301	AC External Power Control
- 24-42-00, P. Block 301	Ground Service Bus Control
- 29-10-00, P. Block 301	Main Hydraulic Power - Pressurization/ Depressurization
- 49-00-00, P. Block 701	Airborne Auxiliary Power
- 52-41-21, P. Block 401	APU Access Doors

3. Procedure

A. Job Set-Up

(1)Put a warning notice in the cockpit to tell persons not to start the APU.

(2)Energize the aircraft electrical network (Ref. AMM 24-41-00, P. Block 301).

(3)Make sure that the hydraulic systems are depressurized (Ref. AMM 29-10-00, P. Block 301).

(4)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(5)Position access platform.

(6)Open access doors 315AL and 316AR.

NOTE: Removal of access doors 315AL and 316AR (Ref. AMM 524121 P. Block 401) avoids obstruction of working area on access platform.

B. General Visual Inspection of all Fire Seals and Walls (Rear, FWD, Sides, Upper and Compartment Doors) for Condition.

R (Ref. Fig. 601)

R (Ref. Fig. 602)

(1)Visual inspection of all fire walls (rear, forward, sides and upper APU compartment doors).

(a)Examine the fire walls at the rear, forward, sides and upper APU compartment doors, examine the interface with the Bleed Air Duct:

- Make sure that there are no cracks, delamination or any other damage.
- Do a check for signs of cracked or flaking paint, wrinkles, buckling or burn marks.
- Make sure that the rivets are not loose or missing.

(b)If necessary replace any loose or missing rivets.

(2)Visual inspection of the fire seals on the APU Access Doors of the APU.

(a)Examine the fire seal on the APU access doors:

- Make sure that they are not worn, cut, twisted or damaged.
- Do a check for signs of deformation, vitrification or solidification.
- Make sure that they are not loose or missing.

(b)If the fire seal is not in the correct condition, or is missing, it must be replaced.

(3)Visual inspection of the fire seal on the Oil-Cooler Outlet Duct.

(a)Examine the fire seal on the Oil-Cooler Outlet Duct:

- Make sure that it is not worn, cut, twisted or damaged.
- Do a check for signs of deformation, vitrification or solidification.
- Make sure that it is not loose or missing.

(b)If the fire seal is not in the correct condition, or is missing, it must be replaced.

(4)Visual inspection of the fire seal on the APU exhaust muffler.

(a)Examine the fire seal on the APU exhaust muffler:

- Make sure that it is not worn, cut, twisted or damaged.
- Do a check for signs of deformation, vitrification or solidification.
- Make sure that it is not loose or missing.

(b)If the fire seal is not in the correct condition, or is missing, it must be replaced.

R (Ref. Fig. 601)

R (Ref. Fig. 602)

4. Close-Up

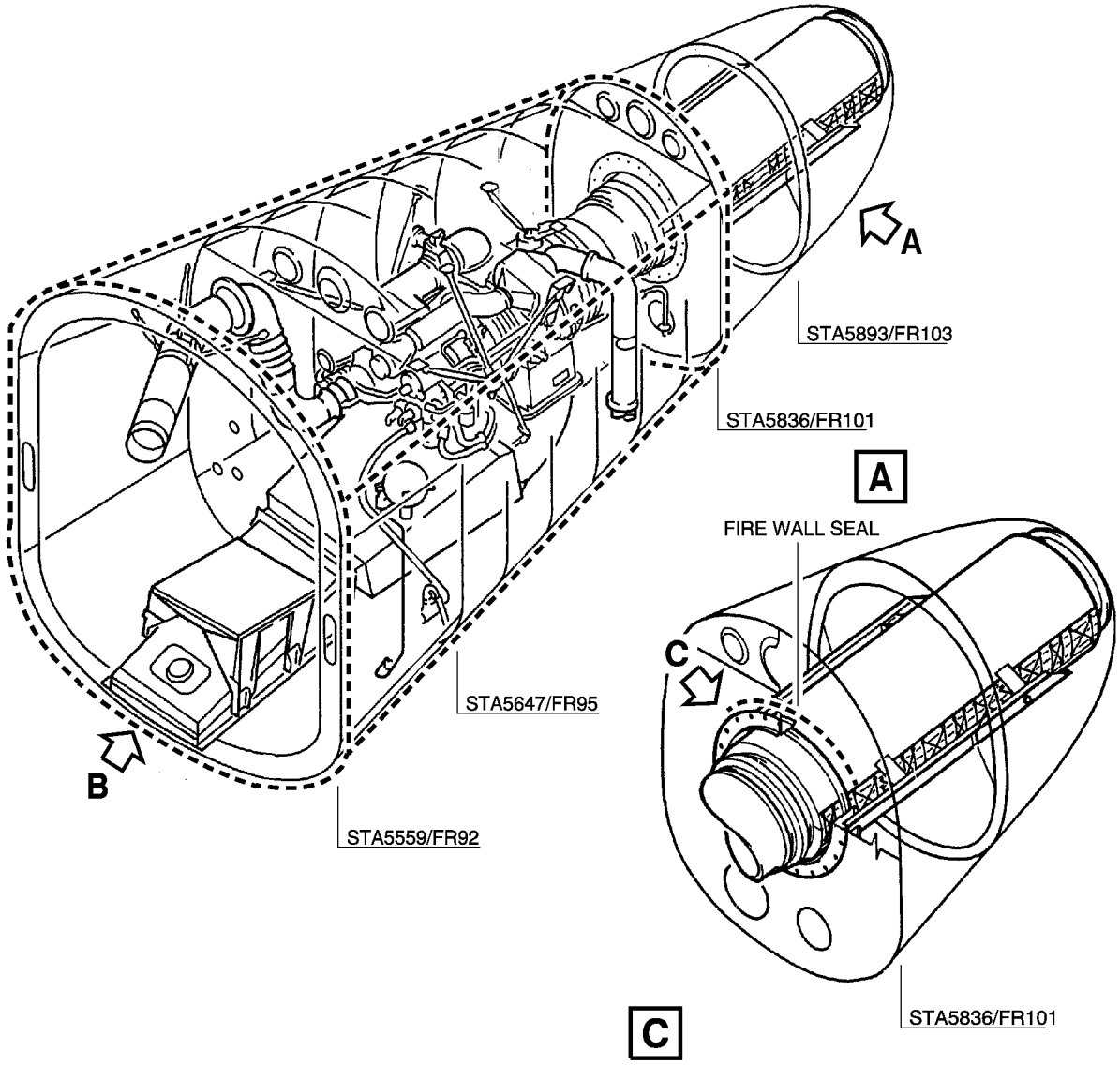
(a)Make sure that the working area is clean and clear of tools and miscellaneous item of equipment.

(b)Install access doors 315AL and 316AR (Ref. AMM 52-41-21, P. Block 401), if removed.

(c)Close access doors 315AL and 316AR and remove access platform.

(d)Remove safety clips and tags and close circuit breakers: 50KA, 1KD, 58KD and 71KD.

(e)De-energize the ground service network (Ref. AMM 24-42-00, P. Block



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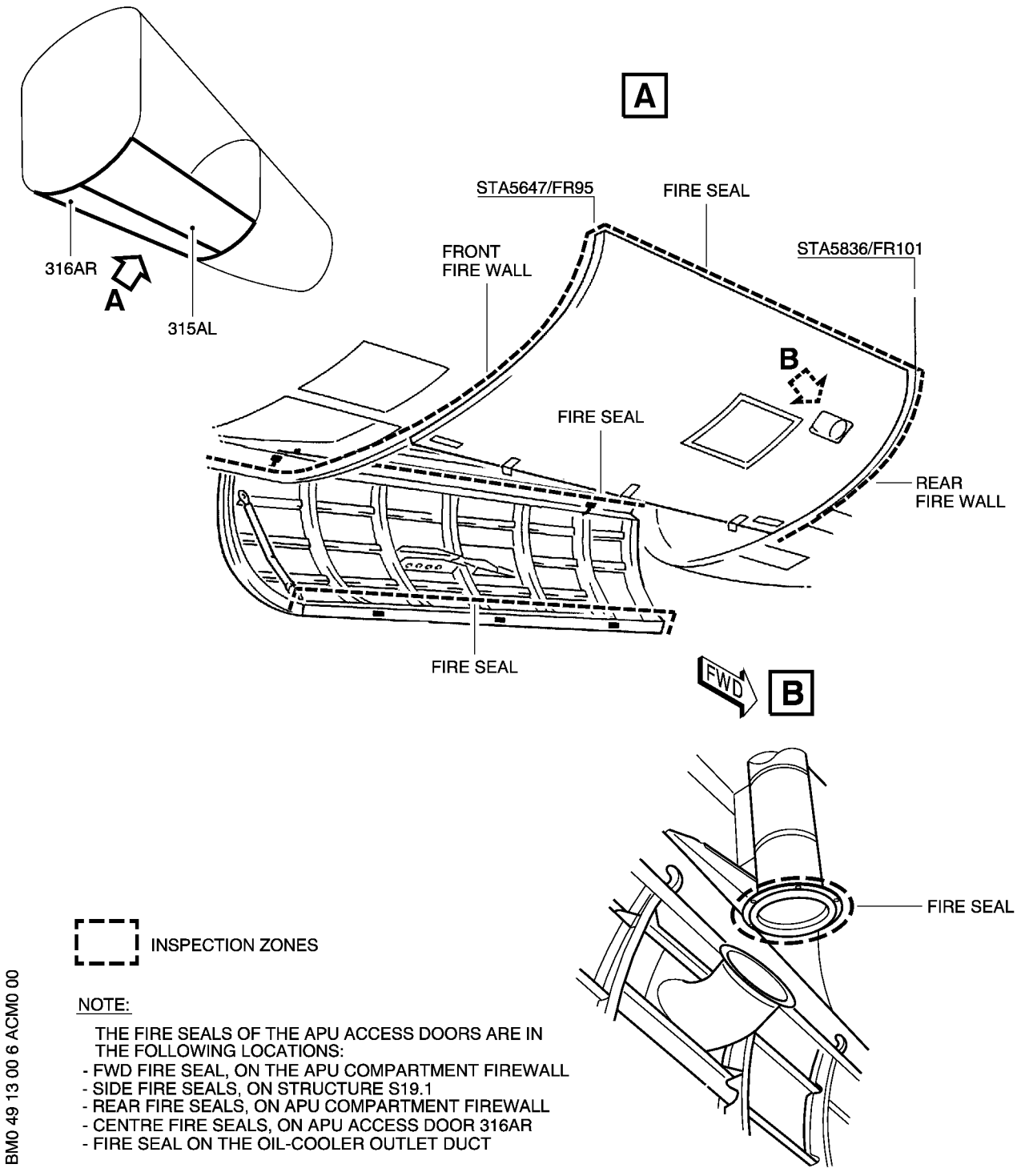
R General Visual Inspection of the Fire Seals
Figure 601



NOTE:

THE FIRE SEALS OF THE APU ACCESS DOORS ARE IN THE FOLLOWING LOCATIONS:
- FWD FIRE SEAL, ON THE APU COMPARTMENT FIREWALL
- SIDE FIRE SEALS, ON STRUCTURE S19.1
- REAR FIRE SEALS, ON APU COMPARTMENT FIREWALL
- CENTRE FIRE SEALS, ON APU ACCESS DOOR 316AR
- FIRE SEAL ON THE OIL-COOLER OUTLET DUCT

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General Visual Inspection of the Fire Seals
Figure 602

R

301).
(f)Remove warning notice(s).

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags

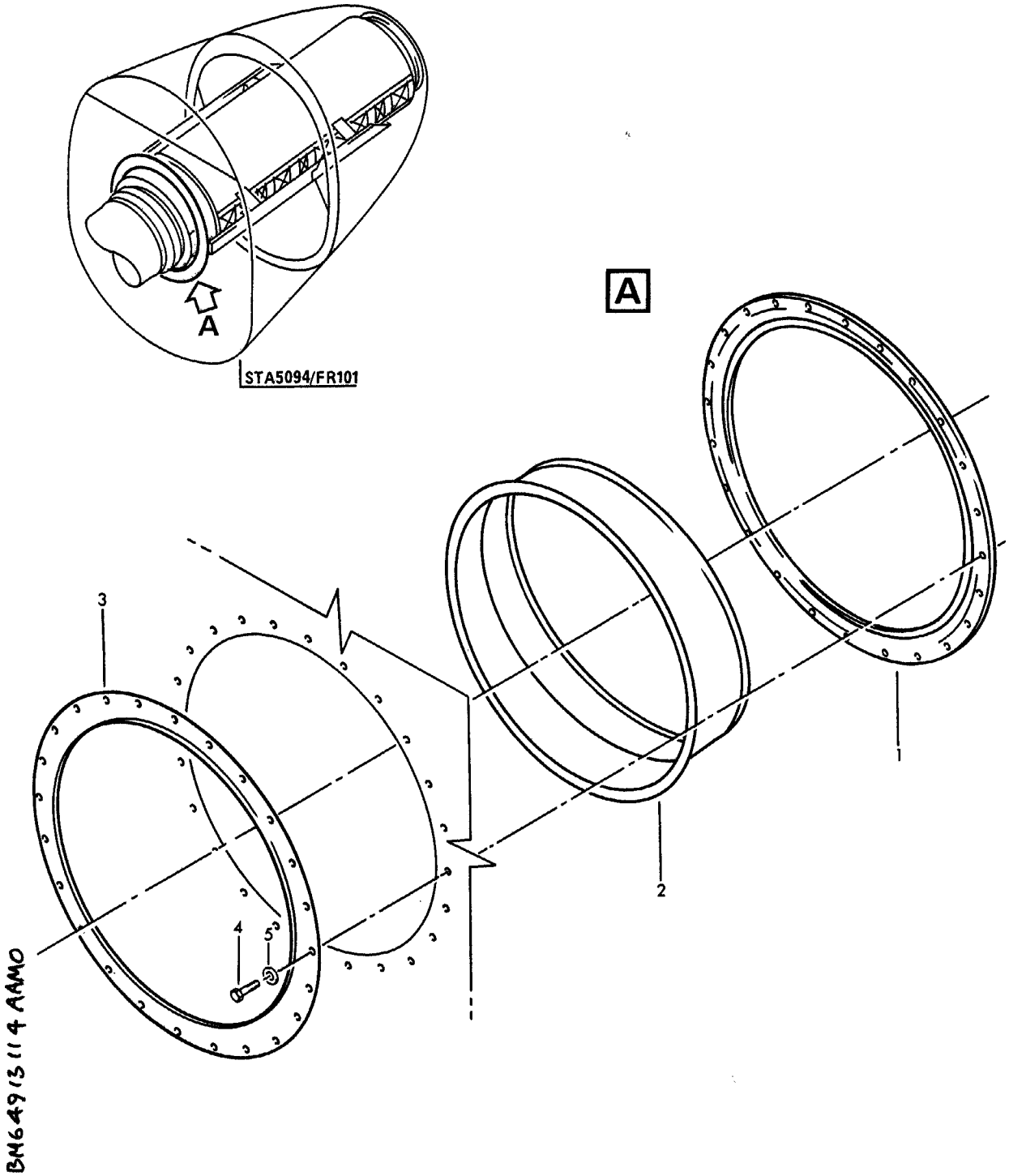
Referenced Procedure

- 49-81-15, P. Block 401	Exhaust Muffler and Sealing Ring

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



Rear Fire Seal
Figure 401

(2)Position access platform and open access doors 315AL, 316AR and 317AL.
(3)Remove exhaust muffler (Ref. 49-81-15, P. Block 401).

B. Removal
(1)Remove bolts (4), washers (5), sealing ring (3), pressure ring (1) and guide sleeve (2).
NOTE : Support pressure ring and guide sleeve to prevent dropping.

C. Preparation for Installation
(1)Visually inspect guide sleeve (2), pressure ring (1) and sealing ring (3) for damage, chafings or cracks.
(2)Replace if necessary.

D. Installation
(1)Position guide sleeve (2), so that narrowest section is on top and install pressure ring (1), sealing ring (3), washers (5) and bolts (4). Align guide sleeve and tighten bolts.
(2)Install exhaust muffler (Ref. 49-81-15, P. Block 401).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL, 316AR and 317AL. Remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD and 71KD.

AIR INTAKE SYSTEM - DESCRIPTION AND OPERATION

1. General

The air intake system directs ambient air to the APU plenum. The system includes the fixed diverter and air intake, with air intake flap at the bottom of fuselage in front of FR95, the inlet duct, consisting of the diffuser and the elbow between FR95 and APU plenum. All components are designed to provide optimum silencing, weight, flow resistance and minimum air inlet distortion to permit APU operation without adverse effects or serious loss of power both on the ground and in flight. The air intake is positioned so as to prevent as far as possible, ingestion of both APU and main engine exhaust gas as well as runway debris. The ingestion of fluids, which could run along the fuselage into the APU, is prevented by the diverter body in front, and the gutter strips parallel to and behind the air intake.

2. Component Location

R **ON A/C 001-100,

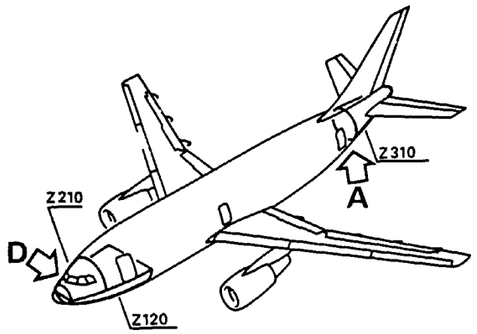
(Ref. Fig. 001)

R **ON A/C 101-200,

(Ref. Fig. 002)

R **ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	AIR INTAKE		315 316	313AL	49-16-11
	INLET DUCT		315 316	315AL 316AL	49-16-14
4KD	RELAY-MAIN	107VU	121	132AZ	
25KD	RELAY-FLAP CLOSE TIME DELAY	107VU	121	132AZ	
50KB	ACTUATOR-AIR INTAKE FLAP		314	313AL	49-16-12
51KD	RELAY-RPM 7%	107VU	121	132AZ	
56KB	RELAY-FLAP FAULT TIME DELAY	107VU	121	132AZ	
63KD	RELAY-FLAP CLOSE	107VU	121	132AZ	
64KD	PUSHBUTTON-FLAP CTL TEST	472VU	212		
65KD	MEMORIZED FAULT ANNUNCIATOR-FLAP CTL	472VU	212		



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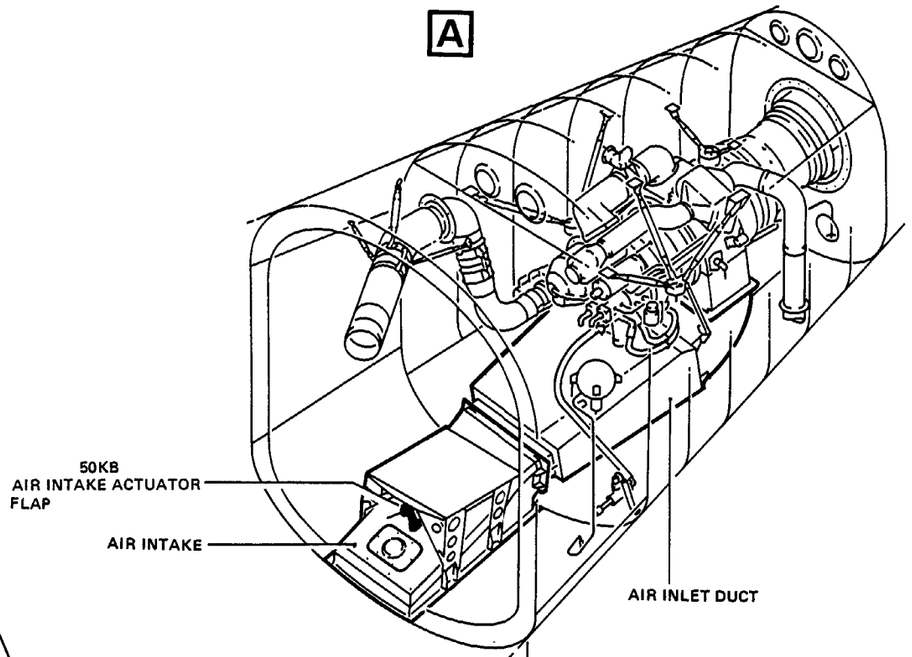

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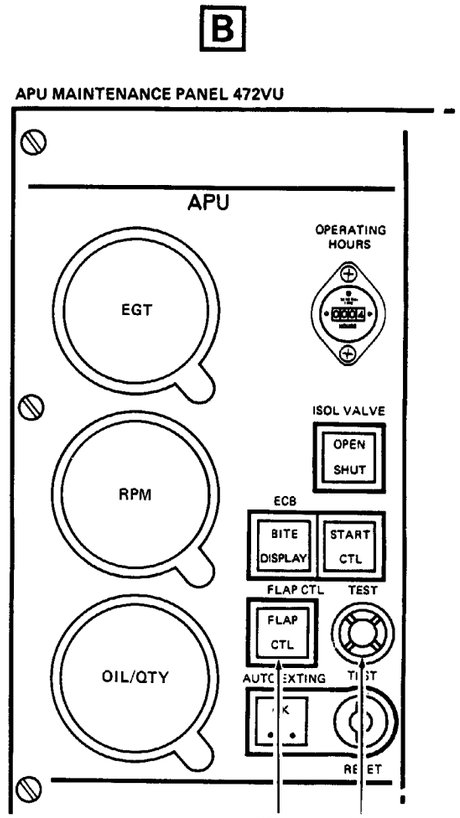

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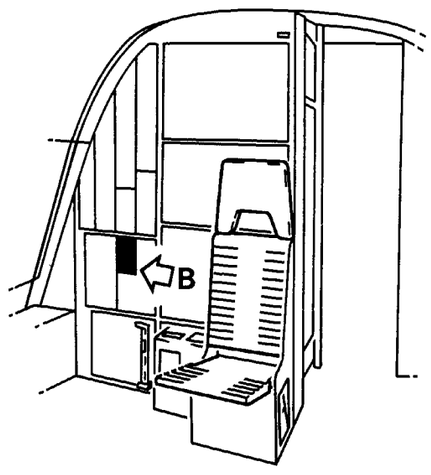

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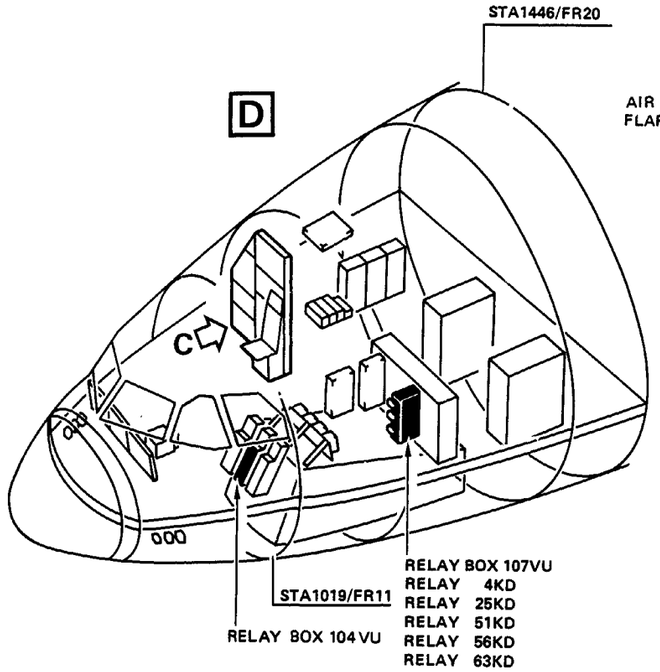

BM6 49 16 00 0 AACO 00

Air Intake System
Figure 001

R EFFECTIVITY: 001-100,

PIA

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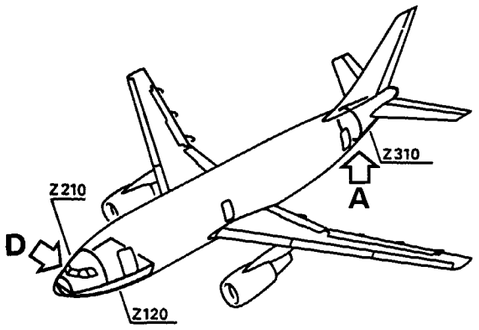

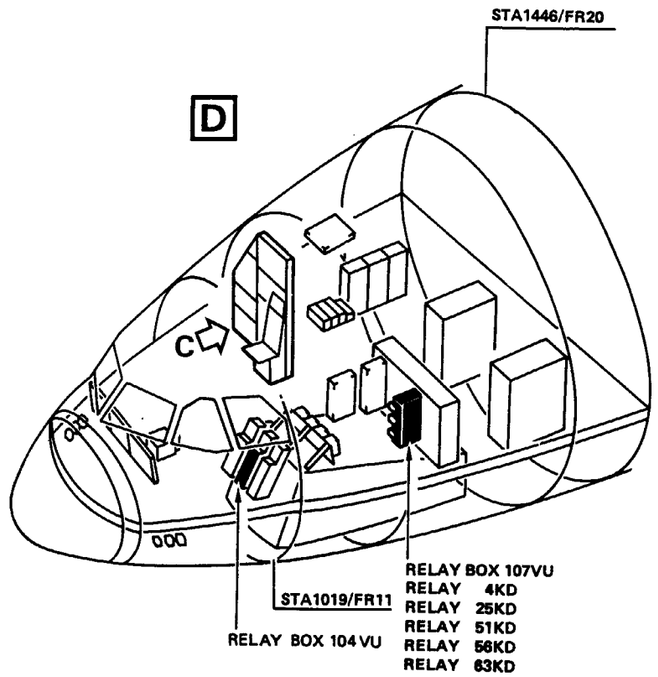

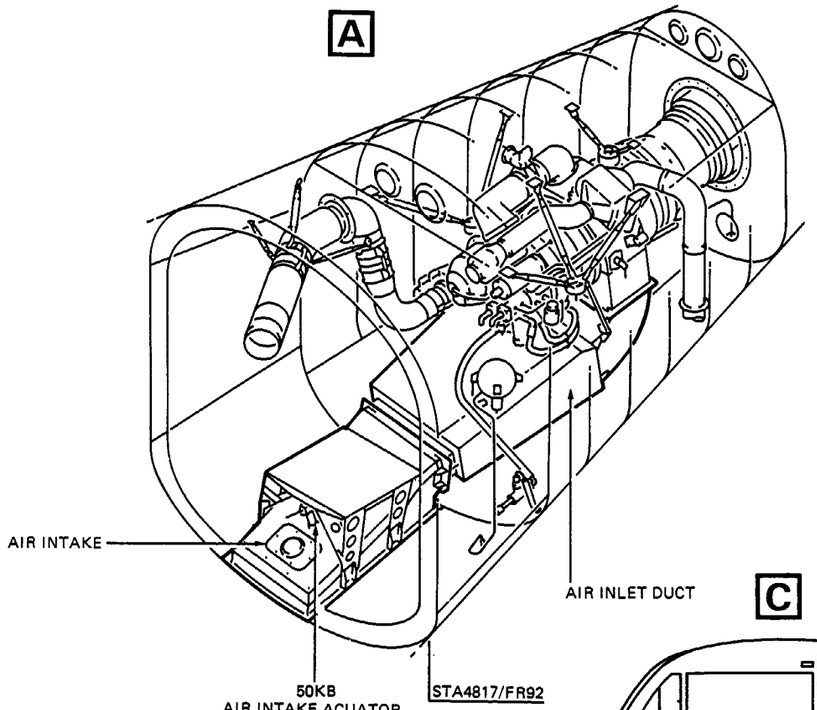

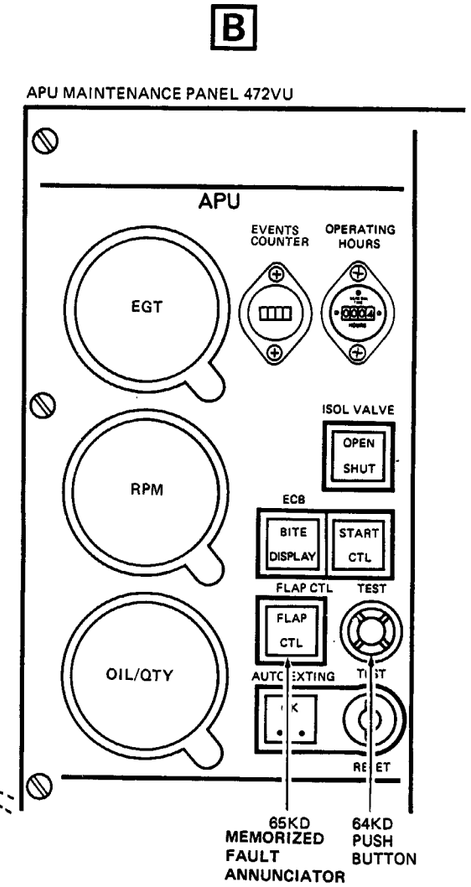

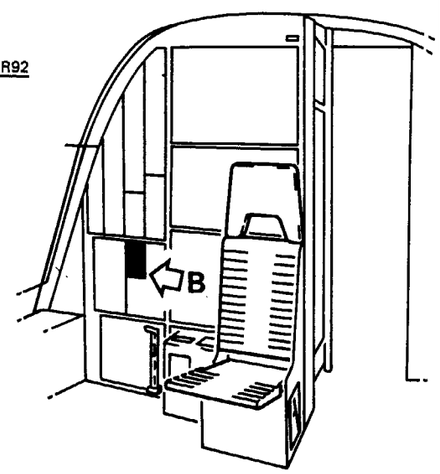

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Air Intake System
Figure 002

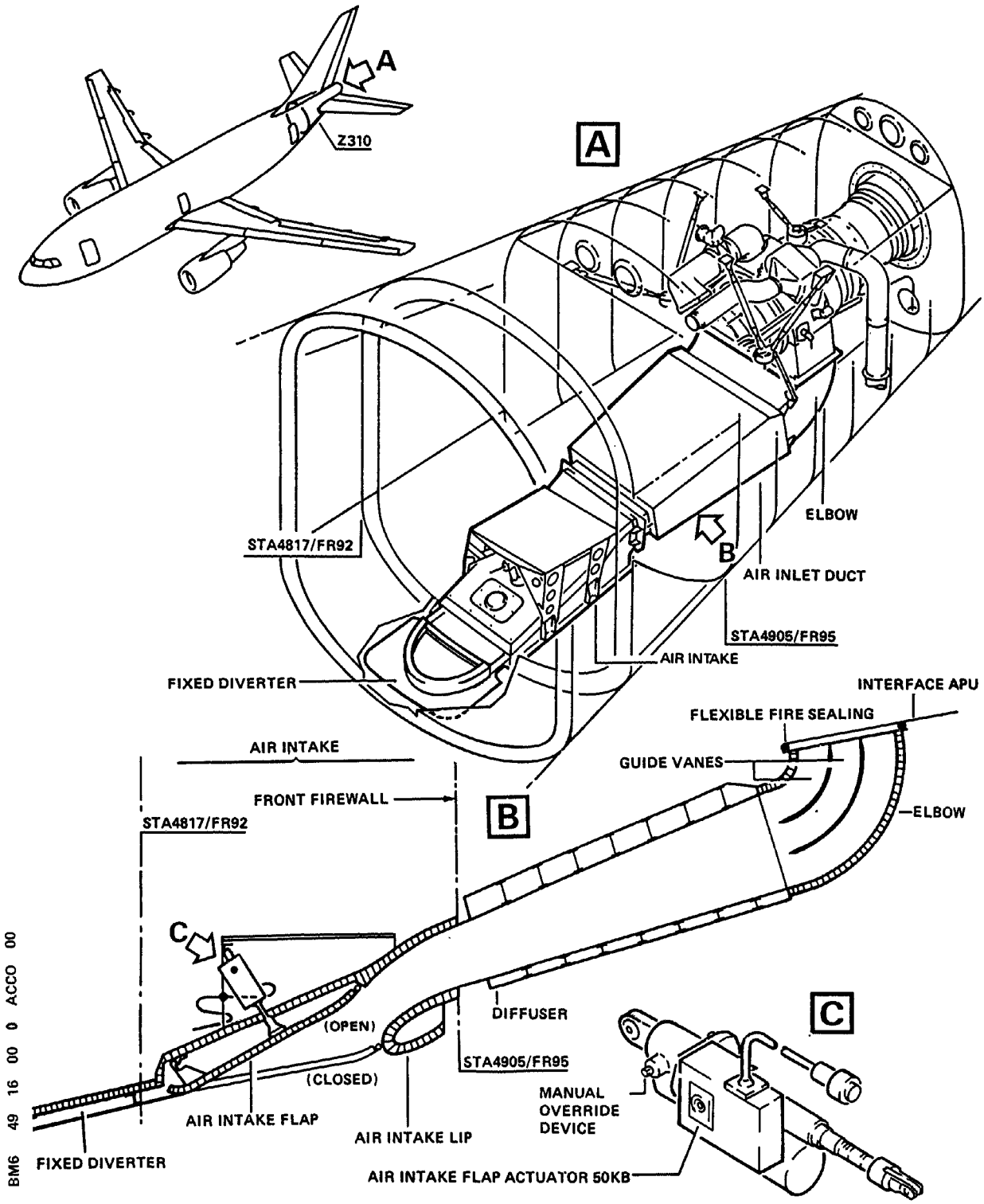
3. Description
(Ref. Fig. 003)

A. Air Intake

The air intake, which is detachable, is mounted on the bottom fuselage in front of FR95 by means of bolted joints.

The air intake is provided with a flap which is closed when the APU is inoperative. When the APU is in operation either in flight or on the ground the flap is open, the operation of the flap is controlled by the APU MASTER SW switch 14KD.

The one-piece air intake housing is a sandwich-type construction, made from NOMEX honeycomb, covered with reinforced fiberglass laminate, as are the air intake lip and the air intake flap. An additional sound insulating layer, made from aluminum-honeycomb with feltmetal facing, is provided on the aluminum upper face of the leading edge and the opposite, inside face of the housing.



Air Intake Components
Figure 003

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B. Diffuser
The diffuser consists mainly of a fireproof, titanium sheet housing with Z-section frames covered by a replaceable acoustic casing. The casing consists of four silencer plates of Al-honeycomb faced on both sides with felt metal. The casing forms, together with the sheet-metal housing and the Z-section frames, a diffusion-type muffler. A drain opening is provided in the lowest part of the diffuser to prevent fluid accumulation.

C. Elbow
The elbow is of double-sandwich type construction.
The inner honeycomb and felt-metal facing provides for silencing and the outer honeycomb with steel covering ensures stability of shape and fire protection.
The two honeycombs are bonded together with an intermediate, nonabsorbent material. To increase the acoustically effective surface area, two guide vanes are installed in the elbow. A drain hole is provided in the lowest part of the elbow to prevent fluid accumulation. The elbow and diffuser are connected to the air inlet duct, which is suspended from the tail cone structure by means of rods below the APU inlet plenum. The relative motion between inlet plenum and duct is secured by a flexible, fireproof sealing.

D. Air Intake Flap Actuator 50KB
The air intake flap is operated by a linear actuator. The actuator consists of a DC motor with brake control, travel limit switches and an electrical connector.
Travel limit switches control the travel range of actuator extension and retraction.
The ball screw assembly, driven by the motor, gears and cluster gears, and controlled by the limit switches, physically performs the extend and retract functions of the actuator.
The actuator linear travel range is 75 mm ±1 mm (2.95 in. ± 0.04 in.).
If the electrical actuating system fails, the air intake flap can be opened and closed for maintenance by 83 rotations of the actuator manual override device. This can be done through the inspection door between FR92 and FR95.

E. Fixed Diverter
The diverter increases installation pressure ratio and improves distortion and intake efficiency.
To avoid ingestion of water and combustible fluids such as skydrol, glycol and in an exceptional case fuel, which could stream along the fuselage into the APU, the fixed diverter is installed.
The diverter body consists of an elliptic shaped diverter profile which is fitted to the fuselage in front of the air intake. It is covered by the diverter plate.

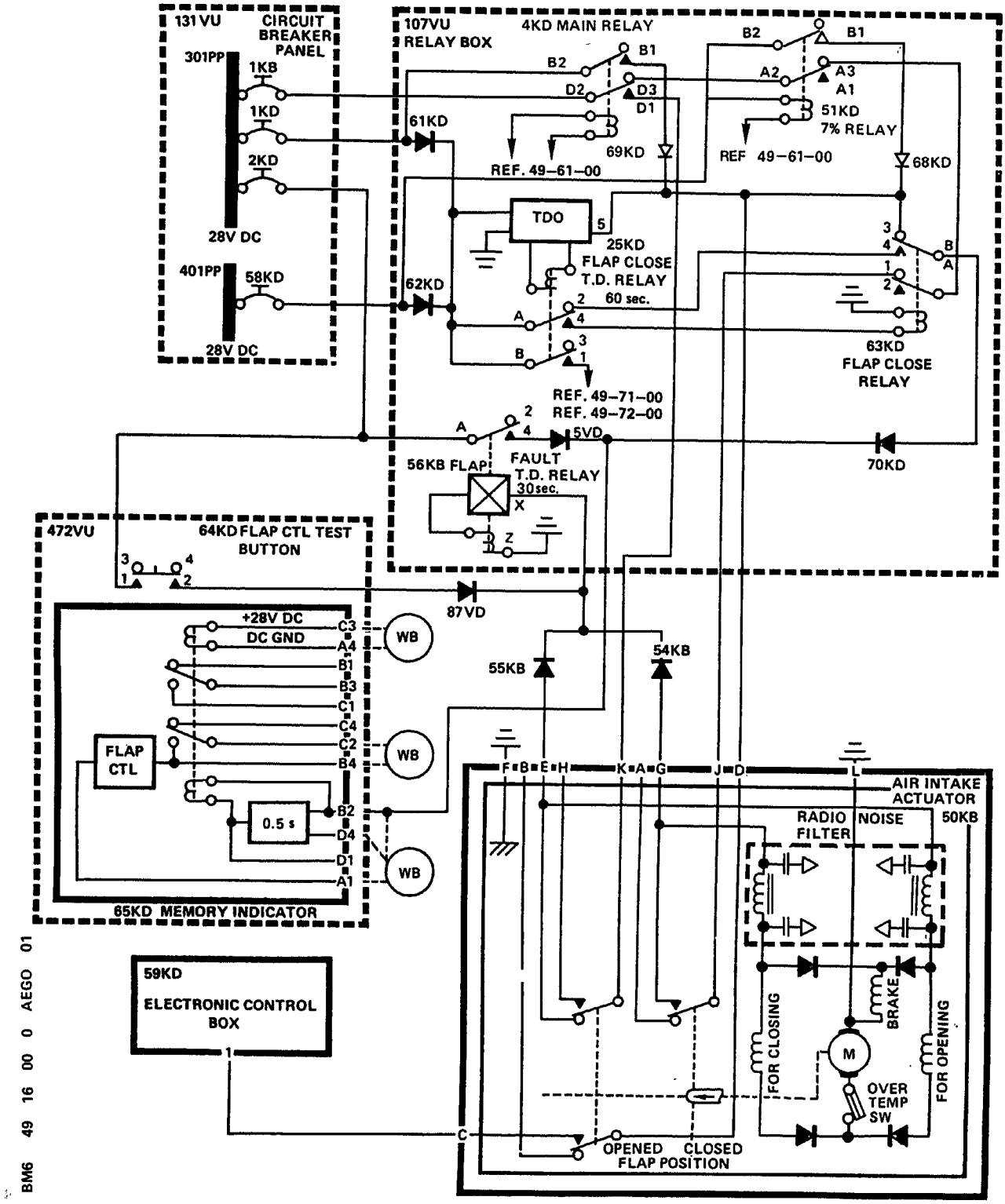
F. Gutter Strips
Gutter strips are installed to both sides and to the rear of the air intake. On ground they prevent ingestion of fluids which could run down the fuselage.
In flight, when the APU is running, the gutter strips together with the diverter body direct fluids which might stream along the fuselage, around the air intake.

4. Operation
(Ref. Fig. 004)

A. The APU air intake flap actuator (50KB) is controlled by:
- APU MASTER SW switch 14KD (via main relay 4KD).
- when operating APU in flight or during ground servicing, APU MASTER SW switch 14KD is placed in ON position, APU air intake flap is opened.
- in flight or during ground servicing, when APU MASTER SW switch 14KD is placed in OFF position, APU air intake flap is closed.

B. An unintentional or premature closing of the intake flap is prevented:
Additional to the APU MASTER SW switch 14KD being in OFF position (main relay 4KD de-energized) APU rpm must be below 7% (7% rpm relay 51KD de-energized and a time of 60 seconds must have elapsed (flap close time delay relay 25KD de-energized).
In case of an electrical failure in the actuating system, the air intake flap can be opened and closed manually for maintenance.

C. A 'FLAP CTL' memorized fault annunciator (MFA) 65KD on the maintenance panel 472VU indicates that the air intake flap actuator 50KB does not open or close the air intake flap within 30 seconds. The normal cycle is approx. 20 seconds. A flap control test is provided for testing the flap fault time delay relay 56KB by pressing the FLAP CTL TEST pushbutton 64KD for a minimum of 30 seconds. After this time the FLAP CTL MFA comes on indicating that the flap fault time delay relay 56KB is functioning correctly.



Air Intake System - Electrical Schematic
Figure 004

D. In case of excessive actuator operating time, additional warnings occur simultaneously:
   - on L ECAM display unit:
     APU
     APU FLAP FAULT
     - MASTER SW ..... OFF
   - single stroke chime aural warning.
   - On main instrument panel:
     MASTER CAUTION lights.

NOTE: For adjustment/test of air intake flap actuator (50KB) refer to 49-16-12, P. Block 201.

1. Operational Test of Flap Control MFA 65KD and Flap Fault Time Relay (56KB)

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz

Referenced Procedures

- 24-41-00, P. Block 301	AC External Power Control
- 33-17-00, P. Block 501	Memorized Fault Annunciators
- 49-16-00, P. Block 501	Trouble Shooting Manual (TSM)

B. Procedure

(1)Job Set-Up

(a)Make certain that the following circuit breaker is closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/WARN	2KD	B56

(b)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(2)Test

R

ACTION	RESULT
1. On panel 472VU: - place ANN LT switch in READ position.	On Panel 472VU: - annunciator light FLAP CTL 65KD is off. - if memorized fault annunciator FLAP CTL 65KD comes on refer to TSM 49-16-00.
- press FLAP CTL TEST pushbutton switch 64KD (switch must be pressed min. 30 sec.)	- after 30 sec. memorized fault annunciator FLAP CTL 65KD comes on.
CAUTION : MAKE CERTAIN THAT MEMORIZED FAULT ANNUNCIATORS ARE RECORDED BEFORE PRESSING MFA RESET PUSHBUTTON.	
2. On panel 472VU: - press MFA RESET pushbutton switch. - place ANN LT switch in OFF position.	On panel 472VU: - memorized fault annunciator FLAP CTL 65KD goes off. - annunciator light FLAP CTL 65KD is off.

(3)Close-Up

(a)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Borescope, Olympus Model 1F6D-10, 6 mm (0.236 in.) dia. with 33 in. (838 mm) working length
D.	Light Source Olympus Model TLK-2 (View direct with 50 degree angle of vision) Flexible end with 240 degrees of travel
E. 98A49007571001	Conduit - Borescope, APU
R F.	Approved Tap Test Device

R

Referenced Procedures

- 49-16-00, P. Block 501	Air Intake System
- 49-16-14, P. Block 401	Inlet Duct

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK WP/CTL	71KD	B53
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

R (2)Position the access platform and open the access doors 313AL, 315AL and
R 316AR.

R B. Inspection
R (1)Inspection of the Air Intake
R (a)Make sure that the surfaces of the air intake are smooth, not excessively eroded and not damaged by FOD (Ref. NTM 51-70-00, P. Block 701).
R (b)Make sure that the sealant in the sealed areas is in the correct condition.
R (c)Do a tap test on the intake area and make sure that there is no delamination.

R NOTE: Use a flashlight and an approved tap test device during the inspection. Do the tap test in a regular, small grid, and do it very carefully on the bend contour and the edges.
R Replace the air intake if it is not in the correct condition (Ref. 49-16-11, P. Block 401). Replace the sealant if it is not in the correct condition.

R (2)Inspection of the Air Intake Flap
R (a)Make sure that the surface of the air intake flap is smooth, not excessively eroded and not damaged by FOD (Ref. NTM 51-70-00, P. Block 701).
R (b)Make sure that the flap is connected correctly to its hinges and the actuator.
R (c)Make sure that the structure of the air intake flap is in the correct condition.
R (d)Do a tap test on the lower surface of the air intake flap.

R NOTE: Use a flashlight and an approved tap test device during the inspection. Do the tap test in a regular, small grid.
R Replace the air intake if it is not in the correct condition (Ref. 49-16-16, P. Block 401).

R (3)Inspection of the Air Intake System
R (a)Do a visual inspection on all surfaces of the air intake system including the intake lip and the guide vanes. Use a borescope where necessary. Make sure that no surface is excessively eroded or damaged by FOD (Ref. NTM 51-70-00, P. Block 701).
R (b)Make sure that the sealant in the sealed areas at the fire wall, the APU compartment and the air duct is in the correct condition.
R (c)Do a tap test on the air intake lip, the air duct and the elbow. Make sure that there is no delamination.

R NOTE: Use a flashlight and an approved tap test device during the inspection. Do the tap test in a regular, small grid, and do it very carefully on the bend contour and the edges.
R Replace the air intake if it is not in the correct condition (Ref. 49-16-18, P. Block 401).
R Replace the air intake duct and/or the elbow if it/they is/are not in the correct condition (Ref. 49-16-14, P. Block 401).
R Replace the sealant if it is not in the correct condition.

R (4)Make an entry in the logbook to documnent the work done.

C. Close-Up

R (1)Make sure that the working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 313AL, 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 1KB, 1KD, 50KD, 71KD, 10QC and 11QC.

AIR INTAKE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
CAUTION : AIR INTAKE WEIGHS APPROX. 22 kg (48.5 lb.)
CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF AIR INTAKE FLAP IS CLEAR BEFORE CLOSING CIRCUIT BREAKERS.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6m (20 ft.)
B.	Blanking Cap and Plug
C.	Circuit Breaker Safety Clips and Tags
D. Material No. 05-027	Special Materials (Ref. 20-31-00)
E. Material No. 08-004	Bonding and Adhesive Compounds (Ref. 20-31-00)
F. Material No. 09-018	Sealants (Ref. 20-31-00)
G. Material No. 09-019	Sealants (Ref. 20-31-00)
H. Material No. 16-003	Structure Paints (Ref. 20-31-00)
Referenced Procedures	
- 49-16-12, P. Block 201	Air Intake Flap Actuator (50KB)
- 49-16-14, P. Block 401	Inlet Duct
- 49-16-16, P. Block 401	Air Intake Flap
- 51-75-10, P. Block 801	Repair of Paint Coatings
- 51-76-10, P. Block 801	Repair of Sealing

2. Procedure

(Ref. Fig. 401)

A. Job Set-up

(1) Open air intake flap.

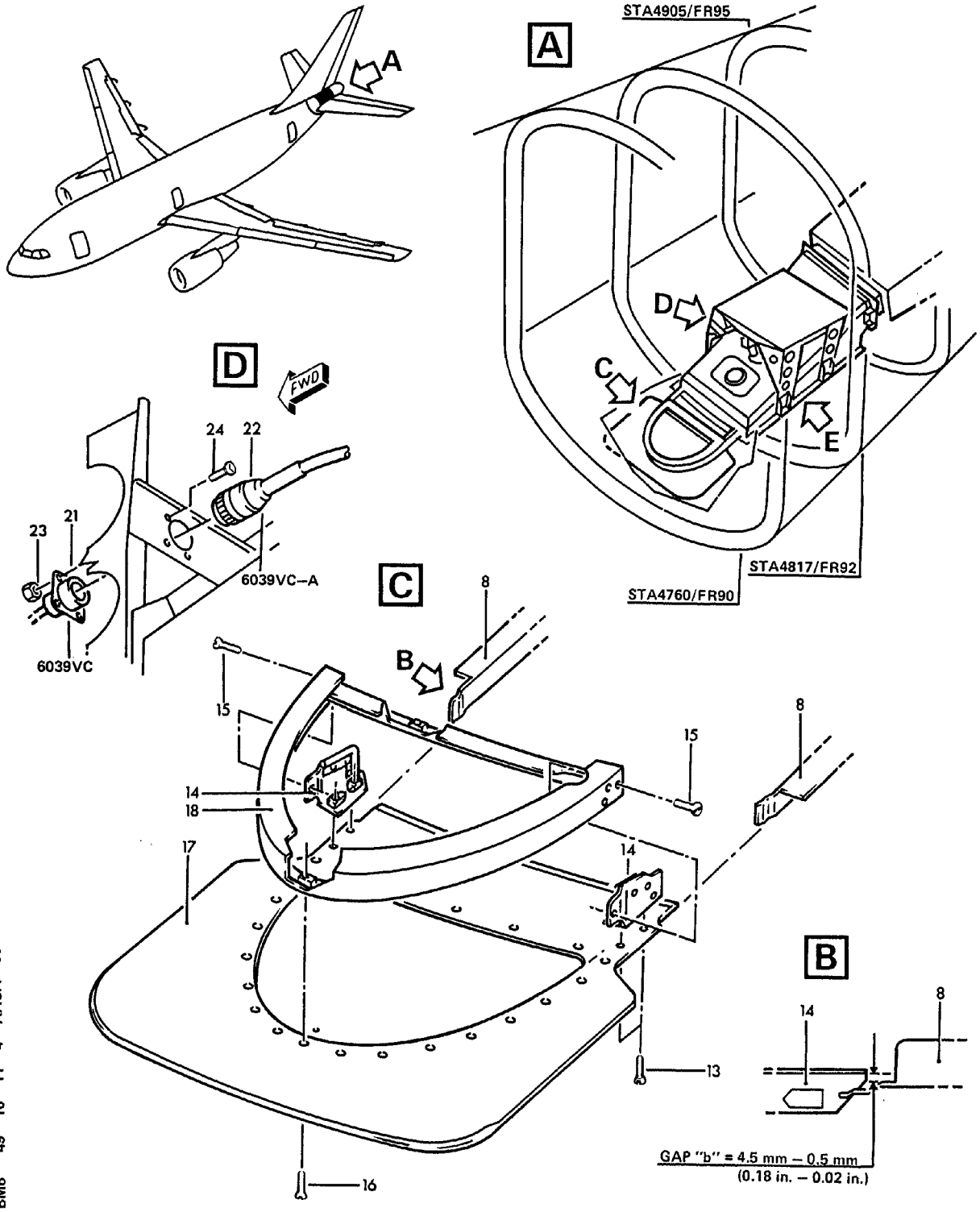
(a) On APU panel 429VU:

1 Place APU MASTER SW to ON position.

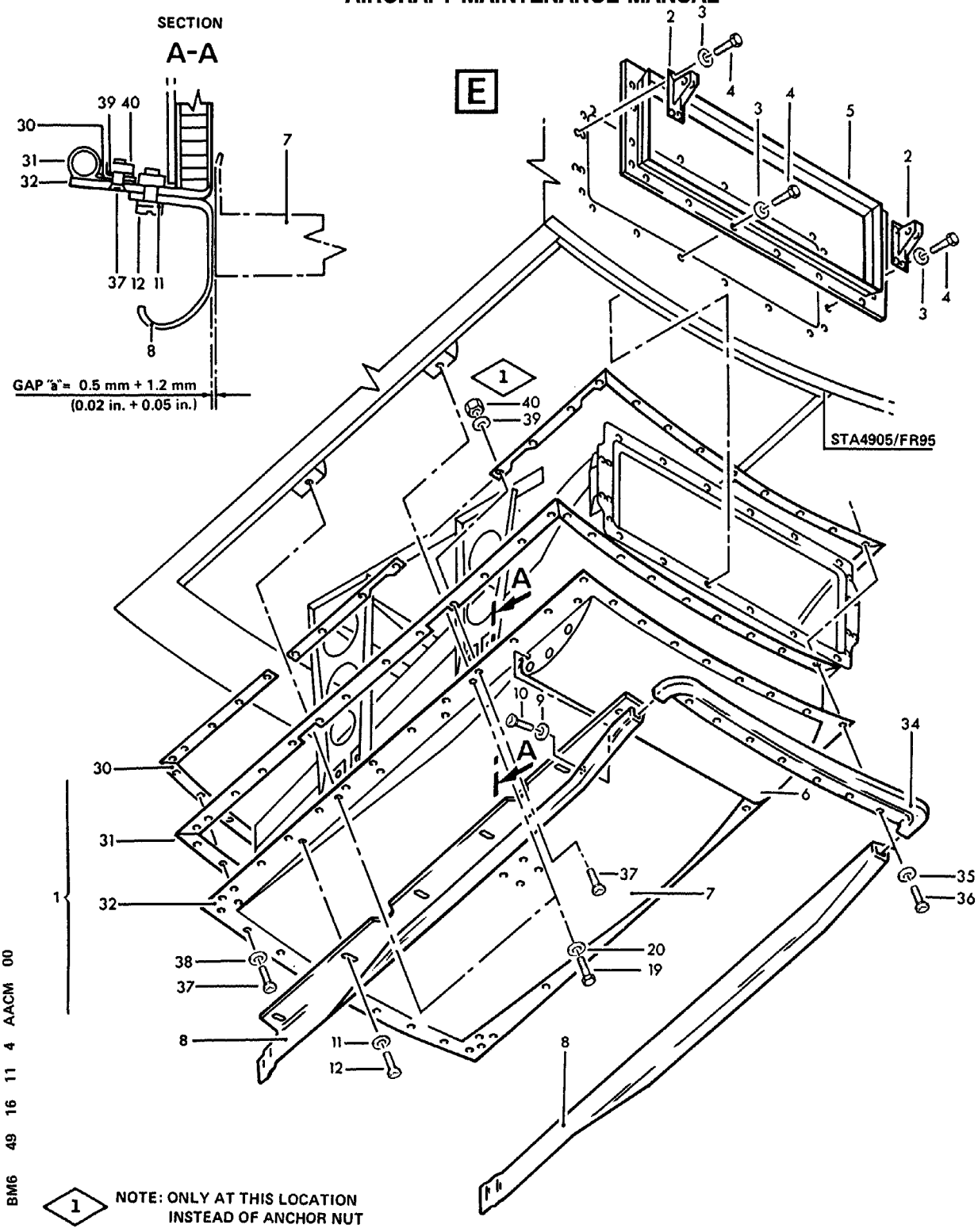
2 Make certain that travel limit switch, of air intake flap actuator 50KB, has switched off when air intake flap is fully open.

NOTE : If electric power is not available, open air intake flap manually (Ref. 49-16-12, P. Block 201).

NOTE : Circuit breaker 1KB has to be opened first, to prevent air intake flap moving.



Air Intake (Sheet 1/2)
Figure 401



Air Intake (Sheet 2/2)
Figure 401

(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(3)ON APU panel 429VU:

(a)Place APU MASTER SW to OFF position.

(4)Position access platform and open access doors 313AL, 315AL and 316AR.

B. Removal
(1)Disconnect electrical connector 6039VC-A (22).
(a)Install blanking cap and plug.
(2)Remove nuts (23), screws (24) and socket 6039VC (21).
(3)Remove inlet duct (Ref. 49-16-14, P. Block 401).
(4)Remove bolts (4), washers (3), brackets (2) and frame (5).
(5)Support diverter plate (17).
(6)Remove screws (13, 16) and diverter plate (17).
(7)Remove screws (15) and diverter coupling plates (14).
(8)Support air intake (1).
CAUTION : AIR INTAKE WEIGHS APPROX. 22 kg (48.50 lb.).
(9)Remove bolts (19) and washers (20).
(10)Lower air intake (1).

C. Preparation for Installation
(1)Visually inspect seals (31), gutter strips (8) and rear gutter strip (34). Replace if necessary.
(a)Remove screws (10), bolts (12), washers (9, 11) and gutter strips (8).
(b)Remove nut (40), screws (36, 37), washers (35, 38, 39), nut plates (30), seals (31) and rear gutter strip (34).
NOTE : Nut (40) and washer (39) are only installed in one position.
(c)Remove remaining sealant from the surfaces of the gutter strips (8), rear gutter strip (34), air intake frame (32), air intake lip (6) and fuselage (Ref. 51-76-10, P. Block 801).
(d)Position seals (31) and nut plates (30).
(e)Apply sealant (Mat. No. 09-018) to contact surface of rear gutter strip (34) (Ref. 51-76-10, P. Block 801).
(f)Install rear gutter strip (34), screws (36, 37), washers (35, 38, 39) and nut (40).
1 Do not tighten at this stage.
(g)Align seals (31), so that air intake edge is overlapped not more than 1 mm (0.04 in.).
(h)Tighten screws (36, 37) and nut (40) alternately.

D. Installation
(1)Make certain that installation area is clean and clear of tools and miscellaneous items of equipment.
(2)Position and support air intake (1).
(3)Install washers (20) and bolts (19). Do not tighten at this stage.
(4)Position frame (5), brackets (2), washers (3) and bolts (4). Tighten bolts (4) in diametrical sequence.
(5)Tighten bolts (19).
(6)Apply sealant (Mat. No. 09-018) to contact surfaces of diverter coupling plates (14) (Ref. 51-20-00).
(7)Position diverter coupling plates (14) and install screws (15). Do not tighten at this stage.
(8)Apply sealant (Mat. No. 09-018) to contact surface of diverter plate (17) (Ref. 51-76-10, P. Block 801).
(9)Position diverter plate (17) and install screws (16, 13).
(10)Tighten screws (15).
(11)Install gutter strips (8), if removed.
(a)Apply sealant (Mat. No. 09-018) to contact surface of gutter strips (8) (Ref. 51-76-10, P. Block 801).
(b)Position gutter strips (8) and install washers (9, 11), bolts (12) and screws (10). Do not tighten at this stage.
(c)Adjust gap 'a' between gutter strips (8) and air intake flap (7) to 0.5 mm +1.2 mm (0.02 in. +0.05 in.).
(d)Make certain that gap 'b' between diverter coupling plates (14) and gutter strips (8) is 4.5 mm -0.5 mm (0.18 in. -0.02 in.). Adjust by moving the gutter strips (8), if necessary.
(e)Tighten bolts (12) and screws (10).
(f)Remove air intake flap (Ref. 49-16-16, P. Block 401).
(12)Seal gaps in following areas with sealant (Mat. No. 09-019) (Ref. 51-76-10, P. Block 801):
(a)Overlapping area of gutter strips (8) and rear gutter strip (34).
(b)Between gutter strips (8) and air intake lip (6).
(c)Contact areas of air intake frame (32) and gutter strips (8) inside of air intake (1).
(d)Contact areas of diverter coupling plates (14) to diverter (18) and diverter plate (17).
(e)Contact area of diverter (18) to diverter plate (17).
(13)Check condition of sealant adhesive (Mat. No. 08-004) in area of diverter, where tail cone contacts structure and repair, if necessary (Ref. 51-76-10, P. Block 801).
(14)Apply nylon coating (Mat. No. 16-003) on all sealed areas (Ref. 51-76-10, P. Block 801).
(15)Install air intake flap (Ref. 49-16-16, P. Block 401).
(16)Install inlet duct (Ref. 49-16-14, P. Block 401).
(17)Remove blanking cap and plug and install socket 6039VC (21) with screws (24) and nuts (23).
(18)Connect electrical connector 6039VC-A (22).

E. Test

CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF AIR INTAKE FLAP IS CLEAR BEFORE CLOSING CIRCUIT BREAKERS.

(1)Remove safety clips and tags and close circuit breakers 50KA, 1KB, 1KD, 2KD, 58KD and 71KD.

(2)Carry out adjustment test of air intake flap actuator (50KB) (Ref. 49-16-12, P. Block 201).

F. Close Up

(1)Apply special material oil (Mat. No. 05-027) to inlet duct attachments and flanges (Ref. 51-75-10, P. Block 801).

(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(3)Close access doors 313AL, 315AL and 316AR.

(4)Remove access platform.

AIR INTAKE FLAP ACTUATOR (50KB) - MAINTENANCE PRACTICES

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

CAUTION : MAKE CERTAIN, THAT TRAVEL RANGE OF AIR INTAKE FLAP ACTUATOR ROD IS CLEAR.

CAUTION : DO NOT USE AN ELECTRICAL OR PNEUMATIC POWER TOOL TO OPEN/CLOSE THE AIR INTAKE FLAP. THIS CAN DAMAGE THE AIR INTAKE FLAP ACTUATOR.

1. Removal/Installation

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.024 in.) dia.
(4)	Cotter Pins
(5)	Blanking Cap and Plug
(6)Material No. 04-004	Common Greases (Ref. 20-31-00)
(7)	External Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 23-44-00, P. Block 1	Cabin and Service Interphone
- 24-41-00, P. Block 301	AC External Power Control

R

B. Procedure

(1)Job Set-Up

(Ref. Fig. 201)

(a)Open, safety and tag the following circuit breakers:

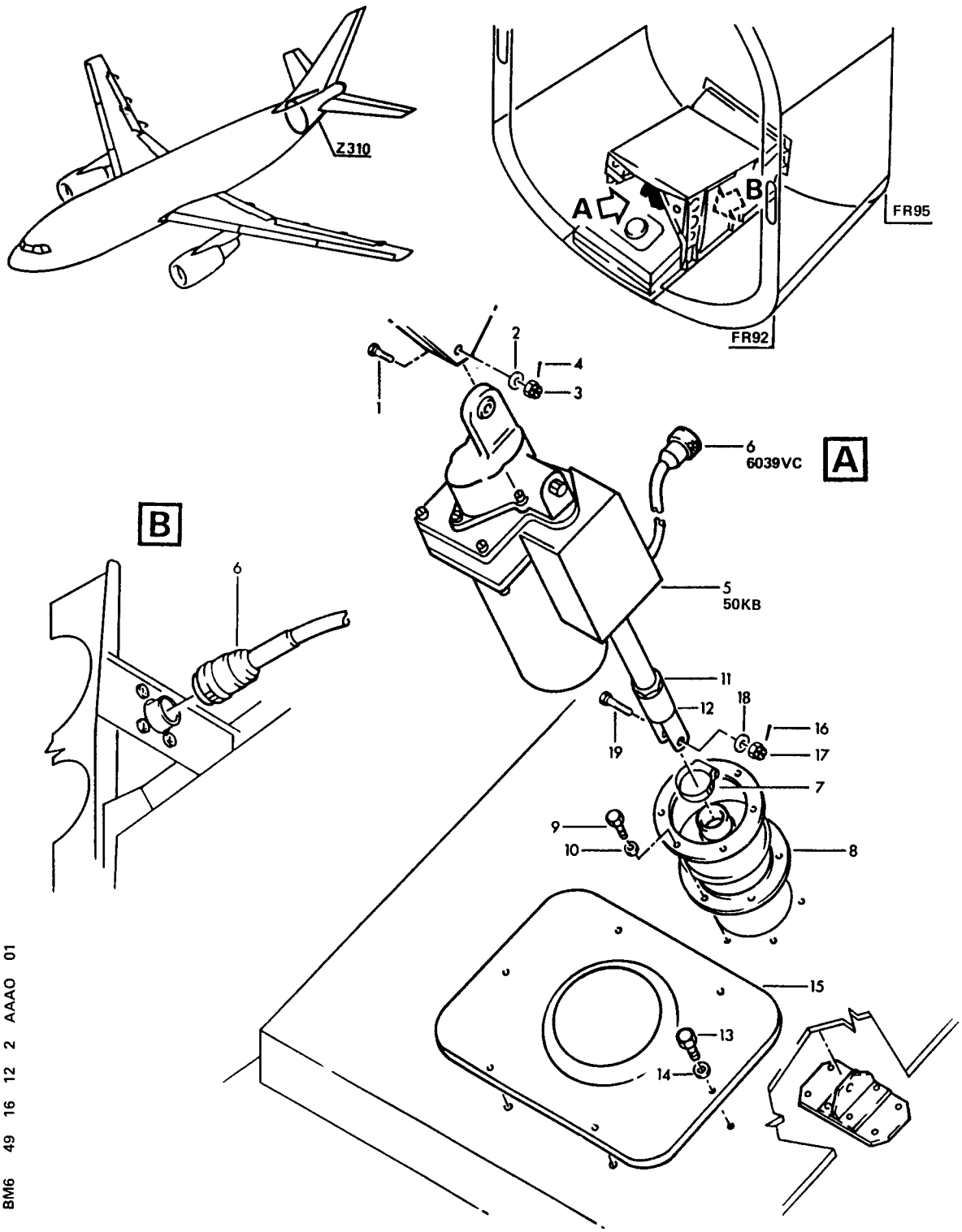
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access door 313AL.

(c)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(d)Make certain that electronics racks ventilation is correct.

(e)Connect service interphone (Ref. 23-44-00, P. Block 1)



Air Intake Flap Actuator
Figure 201

R

(2)Removal
(a)Disconnect electrical connector (6) and fit blanking cap and plug.
(b)Remove screws (13), washers (14) and cover plate (15).
(c)Release clamp (7) and disengage bellows (8).
(d)Support intake flap and remove cotter pin (16), nut (17), washers (18) and bolt (19).
(e)Remove cotter pin (4), nut (3), washer (2), bolt (1) and actuator (5).

(3)Preparation for Installation
(a)Inspect bellows (8) for damage, replace as necessary.
1 Remove bolts (9), washers (10) and bellows (8).
2 Install new bellows (8), washers (10) and bolts (9).
(b)Inspect intake box structure, flap, brackets and attachments for damage, replace as necessary.
(c)Open and close intake flap manually, and inspect adjustment,
R adjust as necessary (Ref. Para. 3.B.(2) and 3.B.(3).
NOTE : Remove lockwire from locknut before installing actuator.
NOTE : Lengthen actuator rod approx. 6 mm (0.24 in.).
1 Loosen locknut (11).
2 Lengthen actuator rod by rotating end fitting (12)
3 Make certain that sufficient actuator rod, thread length is engaged by inspecting safety hole in end fitting (12).
(e)Make certain that replacement actuator is in the electrically retracted position.
1 Remove blanking cap and plug and connect electrical connector (6).
2 On APU panel 429VU:
- Make certain that APU MASTER SW is in OFF position.
3 Remove safety clips and tags and close circuit breakers 50KA and 1KB, this will move actuator electrically to extend position.
4 On APU panel 429VU:
- Place APU MASTER SW to ON position, this will move actuator electrically to retract position.
5 Open, safety and tag circuit breakers 50KA and 1KB.
NOTE : Do not open circuit breakers 50KA and 1KB until travel limit switch of actuator has switched off.
6 On APU panel 429VU:
- Place APU MASTER SW to OFF position.
7 Disconnect electrical connector (6) and fit blanking cap and plug.

(4)Installation

R (a)Apply grease (Mat. No.04-004) to bolt (1).
R (b)Position actuator (5) and install bolt (1), washer (2) and nut (3).
R (c)Safety nut (3) with cotter pin (4).
R (d)Apply grease (Mat. No. 04-004) to bolt (19).
R (e)Position intake flap and install bolt (19), washer (18) and
R nut (17), do not tighten nut (17) at this time.
R NOTE : Make certain that bolt (19) is installed without force and
R actuator end fitting is aligned with intake flap bracket.
R (f)Connect bellows (8) with clamp (7).
R (g)Remove blanking cap and plug and connect electrical connector (6).
R (h)Carry out adjustment test of intake flap and actuator (Ref. Para 2.).
(j)Make certain that circuit breakers 50KA, 1KB, 1KD, 2KD, 58KD and 71KD are opened, safetied and tagged.
R (k)Tighten nut (17) and safety with cotter pin (16).
R (l)Make certain that sufficient actuator rod, thread length is engaged by inspecting safety hole in end fitting (12).
R (m)Tighten locknut (11) and safety with lockwire.
R (n)Make certain that the inner intake box structure and flap area is clean
R and clear of tools and miscellaneous items of equipment.
R (p)Install cover plate (15), with washers (14) and bolts (13).

(5)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Disconnect service interphone (Ref. 23-44-00, P. Block 1).
(c)Close access door 313AL and remove access platform.
(d)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(e)Remove safety clips, tags and close circuit breakers 50KA, 1KB, 1KD, 2KD, 58KD and 71KD.

2. Adjustment/Test

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.024 in.) dia.
(3)	Circuit Breaker Safety Clips and Tags
(4)Material No. 04-004	Common Greases (Ref. 20-31-00)
(5)	Cotter Pin
(6)	External Ground Power Unit - 3-Phase, 115/200 V, 400Hz

Referenced Procedures

- 23-44-00, P. Block 1	Cabin and Service Interphone
- 24-41-00, P. Block 301	AC External Power Control
- 49-16-16, P. Block 401	Air Intake Flap

B. Procedure

(Ref. Fig. 202)

(1)Job Set-Up

(a)Position access platform and open access door 313AL.

(b)Connect service interphone (Ref. 23-44-00, P. Block 1).

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(c)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(d)Make certain that electronics racks ventilation is correct.

(e)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55

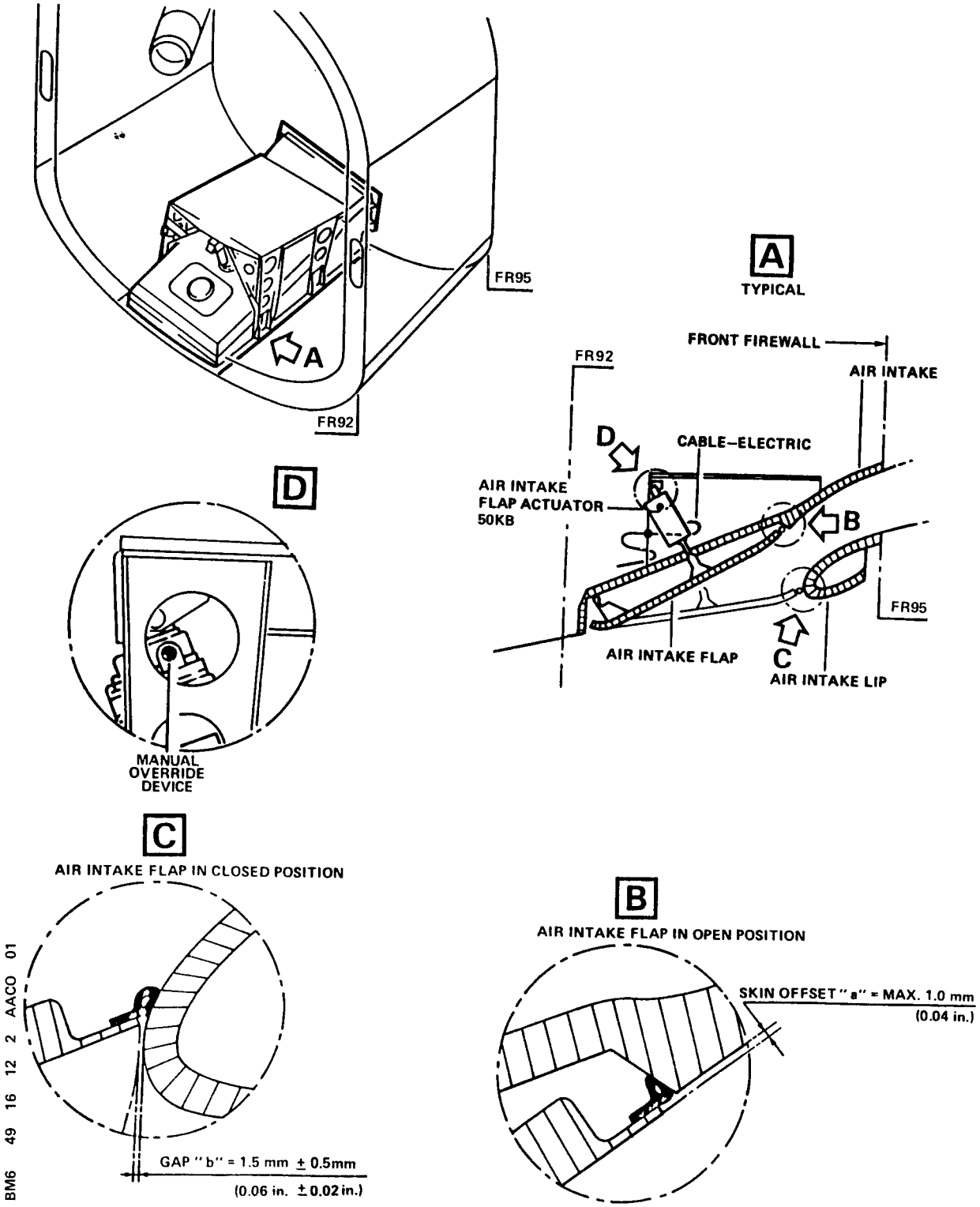
(f)On APU panel 429VU:

1 Place APU MASTER SW to ON position to move flap electrically to open position.

(2)Adjustment/Test

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
R 131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



Air Intake Flap Actuator - Adjustment
Figure 202

R

R (b)Check flap alignment in OPEN position.
The intake flap outer surface must follow the contour of the upper duct wall. Permitted skin offset 'a' from contour is max. 1 mm (0.04 in.) inside line. If necessary adjust as follows:

(Ref. Fig. 201)
1 Remove bolts (13), washers (14) and cover plate (15).
R 2 Remove lockwire and loosen locknut (11).
R 3 Support flap and remove cotter pin (16), nut (17), washer (18) and bolt (19).
R 4 Adjust end fitting (12) as required until correct flap alignment is obtained.
R 5 Make certain that sufficient actuator rod, thread length is engaged by inspecting safety hole in end fitting (12).
R 6 Apply grease (Mat. No. 04-004) to bolt (19).
R 7 Install bolt (19), washer (18) and nut (17).
R NOTE : Make certain that bolt (19) is installed without force and actuator end fitting is aligned with intake flap bracket.
R 8 Safety nut (17) with cotter pin (16).
R 9 Tighten locknut (11) and safety with lockwire.
R 10 Make certain that inner intake box structure and flap area is clean and clear of tools and miscellaneous items of equipment.
R 11 Install cover plate (15) with bolts (13) and washers (14).
(c)Remove safety clips and tags and close circuit breakers 50KA and 1KB.

R (d)Check flap alignment in CLOSED position.
1 On APU panel 429VU:
R Place APU MASTER SW to OFF position to move flap electrically to closed position.
R 2 Make certain, that gap 'b' is 1.5 mm ±0.5 mm (0.06 in ±0.02 in).
R 3 Make certain, that a good seal is made between the intake lip and flap seal (seal compressed).
R 4 If flap seal rests partialy on intake lip, adjustment is required (Ref. 49-16-16, P. Block 401).
R 6 If flap seal does not contact intake lip, install new actuator (Ref. Para. 1.).
(3)Functional Test
(a)Make certain that circuit breakers 50KA and 1KB are closed.
(b)Test.
R NOTE : Make certain that travel limit switches of flap actuator switch off in flap open and closed position.

ACTION	RESULT
1. On APU Panel 429VU:	On Air Intake:
R - Place APU MASTER SW to ON	- flap moves to open position.
2. On APU Panel 429VU:	On Air Intake:
R - Place APU MASTER SW to OFF	- flap moves to closed position.

(4)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Disconnect service interphone (Ref. 23-44-00, P. Block 1).
(c)De-energize aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(d)Close access door 313AL.
(e)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.
(f)Remove access platform.

3. Manual Operation Of Air Intake Flap
NOTE : The intake flap must be placed in the correct position when manually operated, this will prevent damage through duct fluctuations.
A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)

B. Procedure
(Ref. Fig. 202)
(1)Job Set-Up
(a)Position access platform and open access door 313AL.
(b)Open, safety and tag the following circuit breaker:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/AIR INTAKE FLAP	1KB	B55

(2)Open Air Intake Flap Manually

R CAUTION : DO NOT USE AN ELECTRICAL OR PNEUMATIC POWER TOOL TO OPEN/CLOSE
R THE AIR INTAKE FLAP. THIS CAN DAMAGE THE AIR INTAKE FLAP
R ACTUATOR.

CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF INTAKE FLAP IS CLEAR.

(a)Rotate manual override device in counterclockwise (CCW) direction.
to fully open the intake flap.
NOTE : Approx 83 rotations of the manual override device are required.
(b)Check flap alignment in open position.
The intake flap outer surface must follow the contour of the upper duct wall. Permitted skin offset 'a' from contour is max. 1 mm (0.04 in.) inside line.
(c)If necessary, adjust skin offset 'a' by rotating manual override device
(3)Close Air Intake Flap Manually
CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF INTAKE FLAP IS CLEAR.
(a)Rotate manual override device in clockwise (CW) direction
to fully close the intake flap.
NOTE : Approx 83 rotations of the manual override device are required.

(b)Make certain that a good seal is made between intake lip and the flap seal (seal compressed).
(c)If necessary, adjust position of flap by rotating manual override device.
(d)Remove safety clip and tag and close circuit breaker 1KB.

(4)Close-Up
(a)Make certain, that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access door 313AL.
(c)Remove access platform.

AIR INTAKE FLAP ACTUATOR (50KB)
DEACTIVATION/REACTIVATION

Ref. MMEL Section 1-49, Item 6

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MMEL.

R 1. Reason for Job

R A. Air intake flap may be inoperative in open position

R or

R may be inoperative provided APU is not used.

R 2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Cap
D. E0052R14B12PNA	Plug
or	
E0052R14B12PNE	Plug
or	
E0052R14B12PNF3	Plug
E. NSA938003-14	Retaining Nut
F.	Strap (AWG 24)
G. Material No. 16-018	Structure Paints (Ref. 20-31-00)

Referenced Procedures

- 49-16-00, P. Block 501	Air Intake System
- 49-16-12, P. Block 201	Air Intake Flap Actuator (50KB)
- 49-16-00, P. Block 1	Trouble Shooting Manual (TSM)
- 49-73-00, P. Block 1	Analyzers

R 3. Procedure

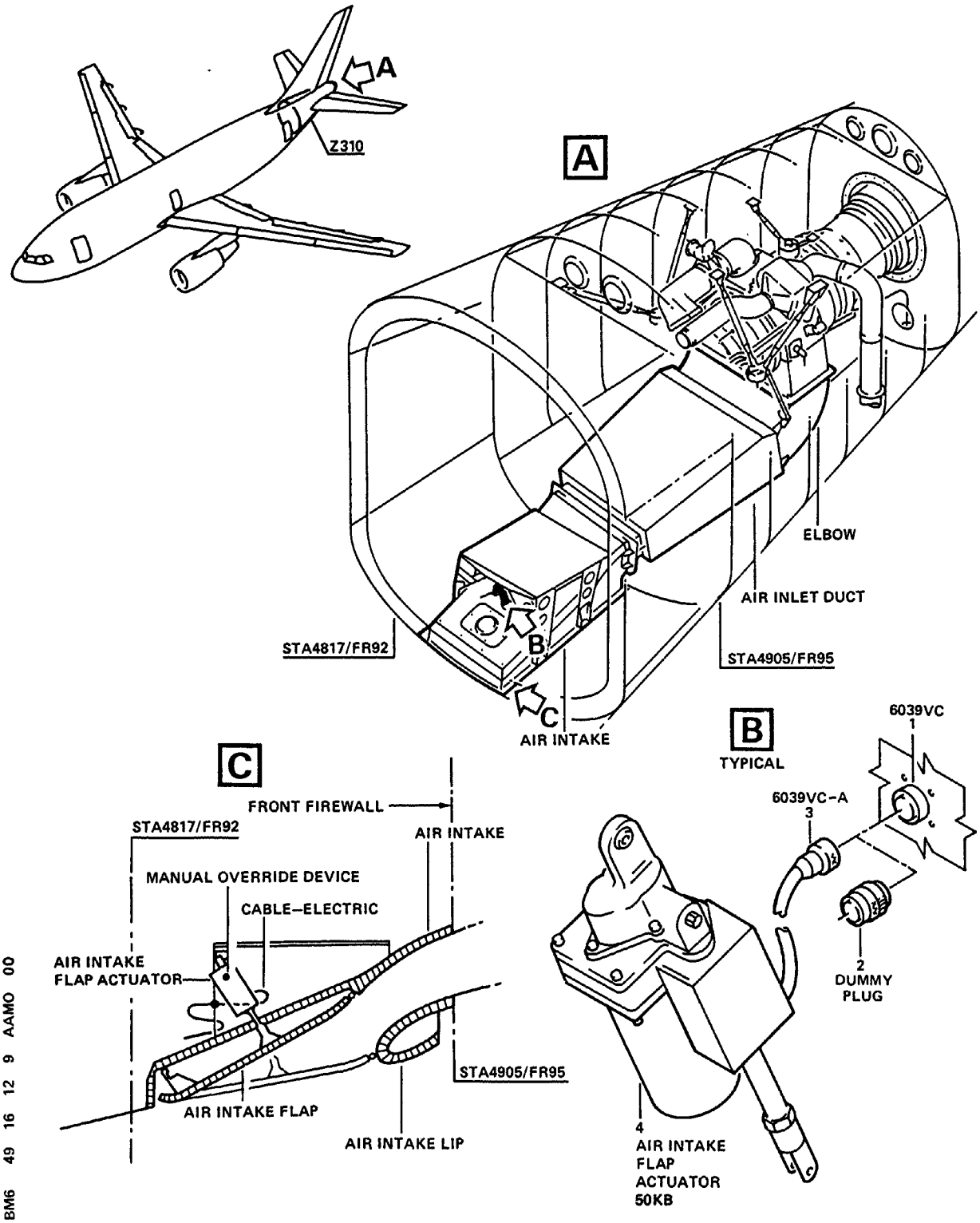
A. Deactivation
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform, 6 m (20 ft.) and open access door 313AL.
(c)In the passenger compartment, open access door 251JC of the LH sidewall stowage compartment.

(2)Deactivation
(Ref. Fig. 901)
(a)Disconnect plug 6039VC-A (3) from connector (1) 6039VC.
(b)Install protective cap on plug (3) and secure to air intake flap actuator (4).
(c)Manufacture dummy plug (2) as follows:
1 Install bonding strap (AWG24) between pins C and D of dummy plug (2) and secure in position with retaining nut (NSA 938003-14).
2 Apply red paint (Mat. No. 16-018) to dummy plug (2).
(d)Install dummy plug (2) onto receptacle (1) 6039VC.
NOTE : By means of dummy plug (2), air intake flap actuator control circuit to ECB is closed by bonding strap between sockets C and D.
(e)Carry out manual opening of air intake flap (Ref. 49-16-12, P. Block 201).
(f)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.
NOTE : Circuit breaker 1KB remains open and tagged until reactivation procedure has been carried out.
(g)On APU maintenance panel 472 VU:
1 Make certain, that FLAP CTL MFA 65KD is off (Ref. 49-16-00, P. Block 501).
(h)On front panel of Electronic Control Box (ECB) 59KD:
Make certain, that indicator 'INLET DOOR' on FAULT DISPLAY matrix is off (Ref. 49-73-00; P. Block 1).
(j)Install a tag in flight compartment to inform flight crew that APU air intake flap actuator is deactivated in air intake flap open position.
(k)Make an entry in the aircraft technical logbook.

(3)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 251JC and 313AL.
(c)Remove access platform.



Air Intake Flap Actuator-Electrical Connection
Figure 901

B. Reactivation

(1)Job Set-Up

(a)Make certain, that the following circuit breaker is opened, safetied and tagged:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/AIR INTAKE FLAP	1KB	B55

(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(c)Position access platform, 6 m (20 ft.) and open access door 313AL.

(d)In the passenger compartment, open access door 251JC of the LH sidewall stowage compartment.

(2)Reactivation

(Ref. Fig. 901)

(a)Disconnect dummy plug (2).

(b)Loosen plug 6039VC-A (3) from air intake flap actuator (4) and remove protective cap.

(c)Connect plug 6039VC-A (3) to receptacle (1) 6039VC.

(d)Remove safety clips and tags and close circuit breakers 50KA, 1KB, 1KD, 2KD, 58KD and 71KD.

(e)Carry out trouble shooting procedure (Ref. 49-16-00, P. Block 101 TSM).

(f)Carry out adjustment/test of air intake flap actuator (Ref. 49-16-12, P. Block 201).

(g)Carry out adjustment/test of air intake system (Ref. 49-16-00, P. Block 501).

(3)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Remove temporary notice in flight compartment.

(c)Record reactivation in the aircraft technical logbook.

(d)Close access doors 251JC and 313AL.

(e)Remove access platform.

INLET DUCT - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

R NOTE : This topic contains the adjustment procedure for the intake duct.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C. Material No. 05-027	Special Materials (Ref. 20-31-00)
D. Material No. 08-004	Bonding and Adhesive Compounds (Ref. 20-31-00)
E. Material No. 09-016	Sealants (Ref. 20-31-00)
F. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 51-75-10, P. Block 801	Repair of Paint Coatings

2. Procedure

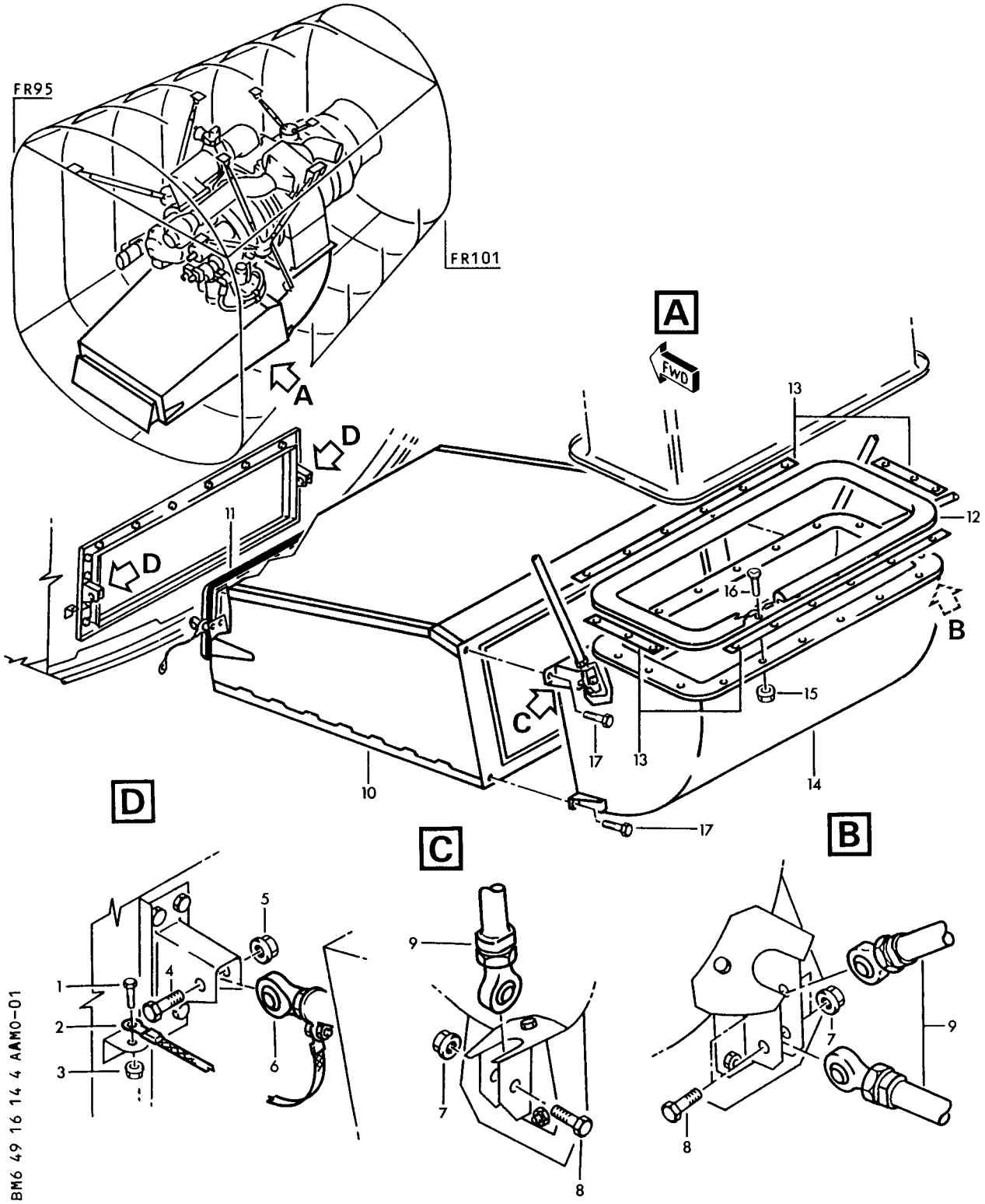
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Air Inlet Duct
Figure 401

R

R B. Removal (Ref. Fig. 401)
(1)Remove nut (3), bolt (1) and disconnect bonding strap (2).
(2)Remove nuts (5), bolts (4) and disconnect tie-rods (6).
(3)Support inlet duct and remove nuts (7) and bolts (8) and disconnect tie-rods (9).
R (4)Pull duct (10) to release seal (11) and remove inlet duct assembly
R from aircraft.
If required to separate duct from elbow.
(5)Remove sealant from inner and outer surface of duct/elbow joint.
(6)Remove bolts (17) and separate duct (10) from elbow (14).
(7)Remove nuts (15), screws (16), strips (13) and seal (12).

C. Preparation for Installation
WARNING : CLEANING AGENT (MAT. NO. 11-003) IS DANGEROUS.
(1)Remove sealant from duct and elbow with cleaning agent (Mat. No. 11-003).
(2)Visually inspect duct and elbow inner and outer surfaces for damage.
(3)Visually inspect tie rods, brackets and seals for damage.

D. Installation
If duct/elbow was separated, assemble as follows.
(1)Position duct (10) to elbow (14) and attach with bolts (17).
(2)Align connection flanges and tighten bolts (17).
NOTE : Make certain that inner surface alignment is less than max. 1 mm (0.04 in.) all round.
(3)Apply sealant (Mat. No. 09-016) to inner and outer joint of duct/elbow.
(4)Check drain holes of duct and elbow are clear.
(5)Align seal (12), strips (13) and install screws (16) and nuts (15).
Install duct assembly to aircraft.
(6)Position inlet duct, align with brackets and tie rods.
(7)Connect tie-rods (9) with bolts (8) and nuts (7).
(8)Connect tie-rods (6) with bolts (4) and nuts (5).
(9)Make certain that duct/elbow assembly is centered on the air intake and APU intake and within the limits given in the adjustment procedure.
(10)Connect bonding strap (2) with bolt (1) and nut (3).
(11)Apply special material (Mat. No. 05-027) thinly to inlet duct attachments (Ref. 51-75-10, P. Block 801).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 71KD, 10QC and 11QC.

R 3. Inlet Duct - Adjustment

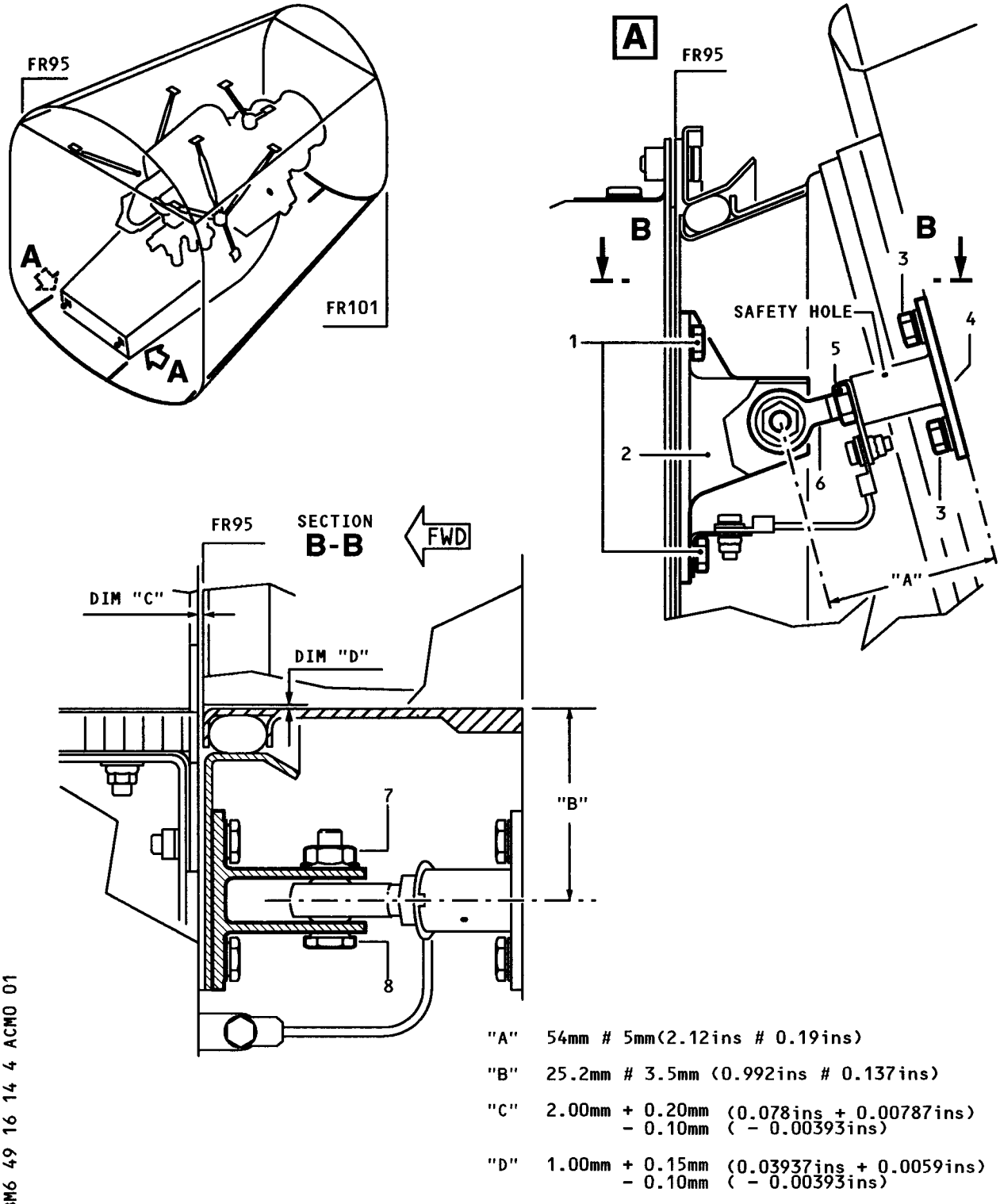
R A. Procedure (Ref. Fig. 402)
R (1) To adjust FWD tie rods, loosen lock nuts (5), remove nuts (7) and bolts (8).
R (2) Turn eye end (6) of tie rod in the direction required to obtain dimension 'A'.
R (3) Install bolts (8), nuts (7)
R (4) Make certain eye end of tie rod is in safety, tighten and wirelock locknuts (5).
R (5) If required, loosen bolts (1) and adjust bracket (2) vertically to obtain correct dimensions 'B', 'C' and 'D'.
R (6) If required, loosen bolts (3) and adjust bracket (4) horizontally to obtain correct dimensions 'B', 'C' and 'D'.

R Dimensions for FWD Tie Rod Adjustments:- (Ref. Fig. 402)
R 'A' 54.00, + 5.00, - 5.00 mm. (2.12, + 0.19, - 0.19 ins.).
R 'B' 25.2, + 3.5, - 3.5 mm. (0.992, + 0.137, - 0.137 ins.).
R 'C' 2.00, + 0.20, - 0.10 mm. (0.078, + 0.0078, - 0.0039 ins.).
R 'D' 1.00, + 0.15, - 0.10 mm. (0.0393, + 0.0059, - 0.00393 ins.).

R B. Procedure (Ref. Fig. 403)
R (1) To adjust REAR tie rods, loosen locknuts (1) at both ends of all tie rods.
R (2) Rotate centre barrel (2) of rods to adjust length until required dimensions 'A' and 'B' are reached.
R (3) Make certain that the rods are evenly tensioned, and are in safety.
R (4) Tighten and wirelock locknuts (1).

R Dimensions for REAR Tie Rod Adjustments:- (Ref. Fig. 403)
R 'A' 18.00, + 2.00, - 2.00 mm. (0.708, + 0.078, - 0.078 ins.).
R 'B' 4.4, + 4.00, - 4.00 mm. (0.173, + 0.157, - 0.157 ins.).

R C. Close-Up
R (1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
R (2) Close access doors 315AL and 316AR and remove access platform.
R (3) Remove safety clips and tags and close circuit breakers 50KA, 1KD, 71KD, 10QC and 11QC.



"A" 54mm # 5mm(2.12ins # 0.19ins)

"B" 25.2mm # 3.5mm (0.992ins # 0.137ins)

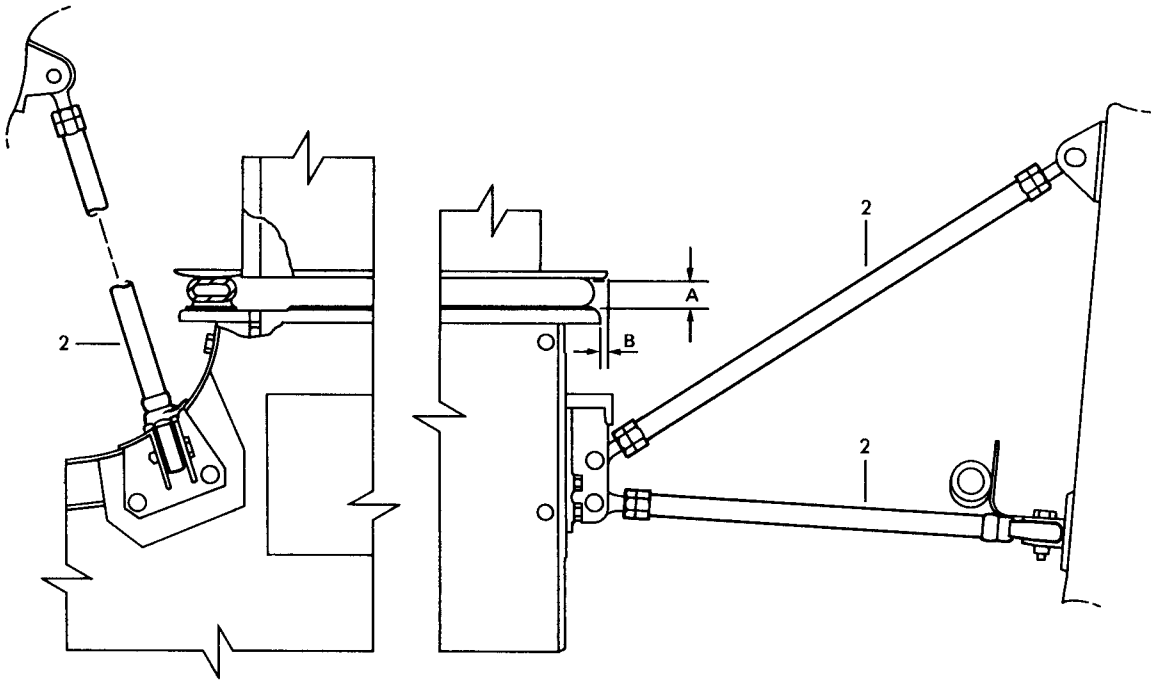
"C" 2.00mm + 0.20mm (0.078ins + 0.00787ins)
- 0.10mm (- 0.00393ins)

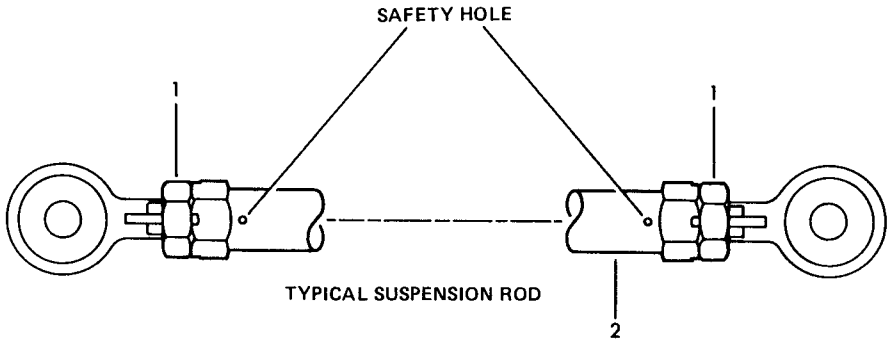
"D" 1.00mm + 0.15mm (0.03937ins + 0.0059ins)
- 0.10mm (- 0.00393ins)

BM6 49 16 14 4 ACMO 01

Inlet Duct - FWD Tie Rods
Figure 402

R





A = 18mm ±2mm ALL ROUND (0.708in. ±0.078in.)

B = 4 4mm ±4.0mm ALL ROUND (0.173 ±0.157in.)

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Inlet Duct - REAR Tie Rods
Figure 403

AIR INTAKE FLAP - REMOVAL/INSTALLATION

1. Equipment and Material

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C. Material No. 04-004	Common Greases (Ref. 20-31-00)
D.	Cotter Pin
Referenced Procedure	
- 49-16-12, P. Block 201	Air Intake Flap Actuator (50KB)
- 49-16-12, P. Block 401	Air Intake

2. Procedure

A. Job Set-Up
(1) Open air intake flap.
(a) On APU panel 429VU:
1 Place APU MASTER SW to ON position.
2 Make certain, that travel limit switch of air intake flap actuator 50KB has switched off, when air intake flap is open.
NOTE : If electric power is not available, open air intake flap manually (Ref. 49-16-12, P. Block 201).
NOTE : Open circuit breaker 1KB first, to avoid air intake flap moving.

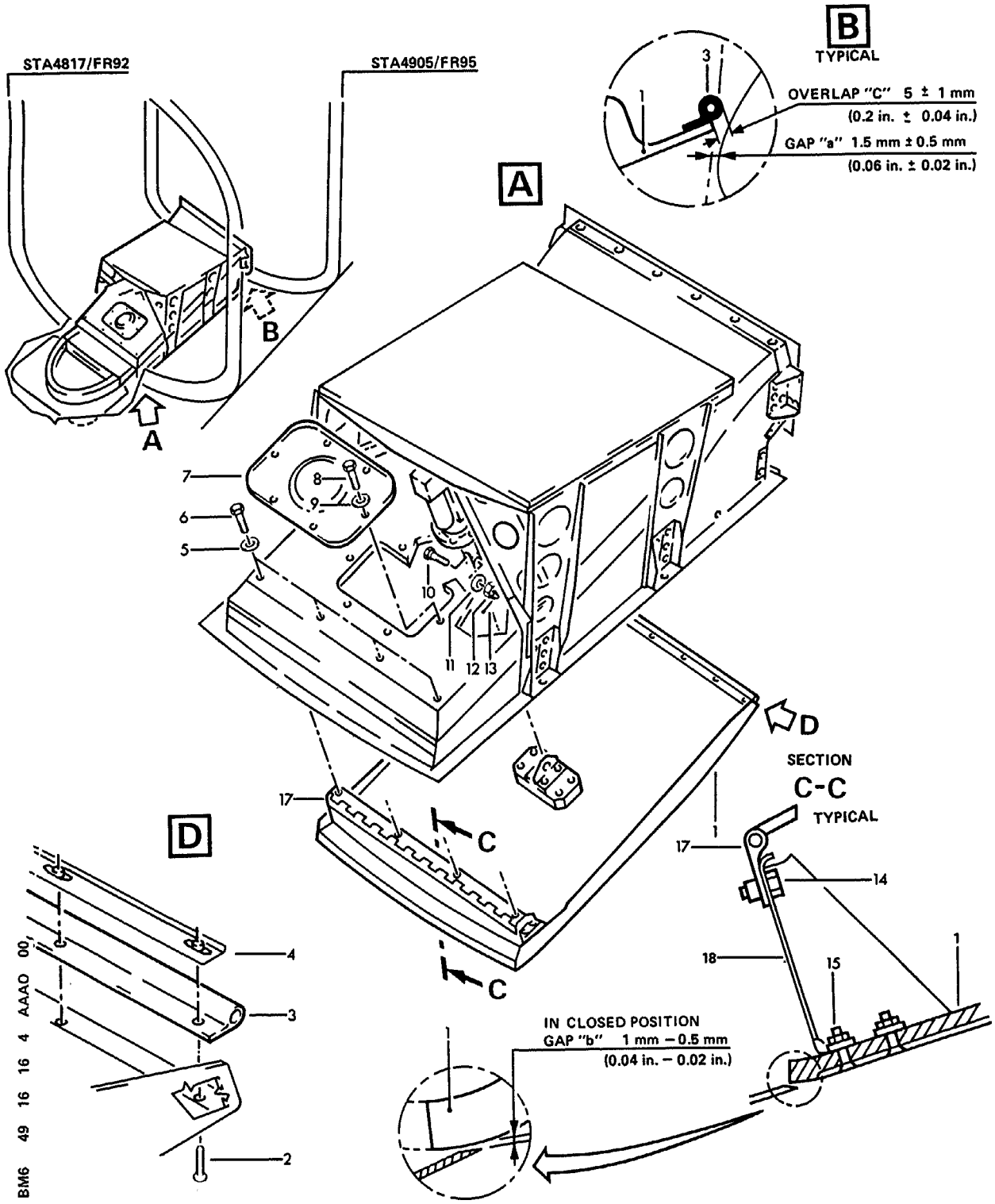
(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(3)On APU panel 429VU:
  (a)Place APU MASTER SW to OFF position.
(4)Position access platform and open access doors 313AL, 315AL and 316AR.

B. Removal
(Ref. Fig. 401)
(1)Remove bolts (8), washers (9) and access cover (7).
(2)Disconnect actuator rod.
(a)Remove cotter pin (13), nut (12) and washer (11). Discard cotter pin.
(b)Support intake flap and remove bolt (10).
(c)Remove air intake flap from actuator rod by lowering air intake flap (1) into closed position.
(3)Remove bolts (6), washers (5) and intake flap (1).
NOTE : Make certain that intake flap cannot drop down.

C. Preparation for Installation
(1)Inspect intake flap for damage.
(2)Inspect seal (3) for damage. Replace, if necessary.
(a)Remove screws (2), attachment rail (4) and seal (3).
(b)Position seal (3) and attachment rail (4), and install screws (2). Do not tighten at this stage.
(c)Align seal (3) so that overlap 'c' at air intake flap edge is 5 ± 1 mm (0.2 ± 0.04 in.).
(d)Tighten screws (2).



Air Intake Flap
Figure 401

D. Installation
(1)Position intake flap (1) in closed position and support.
(2)Install washers (5) and bolts (6).
(3)Make certain that gap at both sides between air intake flap (1) and air intake box structure is 1.6 mm + 1.1 mm (0.063 in. + 0.043 in.).
(a)For adjustment of air intake flap, loosen bolts (6, 14), reposition air intake flap and retighten bolts (6, 14).
(4)Make certain that gap 'a' between air intake flap (1) and air intake lip is 1.5 mm ± 0.5 mm (0.06 in. ± 0.02 in.).
(a)For adjustment of air intake flap, loosen nuts (15) and bolts (6), reposition flap and retighten nuts (15) and bolts (6).
(5)Make certain that deviation from parallel between air intake flap (1) and air intake lip is not more than 1 mm (0.04 mm).
(a)Adjust flap, if necessary, by installing additional washers between flap hinge (17) and flap bracket (18).
1 Loosen bolts (14).
2 Remove respective bolts (14) and install additional washers to obtain flap adjustment.
3 Install and tighten bolts (14).
(6)Make certain that gap 'b' between air intake flap (1) in closed position and ramp section is 1 mm - 0.5 mm (0.04 in. - 0.02 in.).
(a)For adjustment of air intake flap, loosen bolts (14), reposition flap and retighten bolts (14).
(7)Connect actuator rod.
(a)Lift intake flap into open position, connect actuator rod and support flap.
(b)Apply grease (Mat. No. 04-004) to bolt (10) and install with washer (11), nut (12) and new cotter pin (13).
NOTE : Make certain, that bolt (10) can be installed without force and actuator is aligned with air intake housing bracket.
(8)Make certain that air intake housing interior is clean and clear of tools and miscellaneous items of equipment.

E. Test
(1)Carry out Adjustment/Test of air intake flap actuator (50KB) (Ref. 49-16-12, P. Block 201).

F. Close-Up
(1)Install access cover (7) with washers (9) and bolts (8).
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close access door 313AL and remove access platform.
CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF AIR INTAKE FLAP IS CLEAR BEFORE CIRCUIT BREAKERS ARE CLOSED.
(4)Remove safety clips and tags and close circuit breakers 50KA, 1KB, 1KD, 2KD, 58KD and 71KD.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Material

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags

Referenced Procedures

- 49-16-12, P. Block 201	Air Intake Flap Actuator (50KB)
- 49-16-14, P. Block 401	Inlet Duct
- 51-76-10, P. Block 801	Repair of Sealing

2. Procedure

A. Job Set-Up
(1)Open air intake flap.
(a)On APU panel 429VU:
1 Place APU MASTER SW to ON position.
2 Make certain, that travel limit switch of air intake flap actuator 50KB has switched off, when air intake flap is open.
NOTE : If electric power is not available, open air intake flap manually (Ref. 49-16-12, P. Block 201).
NOTE : Open circuit breaker 1KB first, to avoid air intake flap moving.
(2)Open, safety and tag the following circuit breakers:

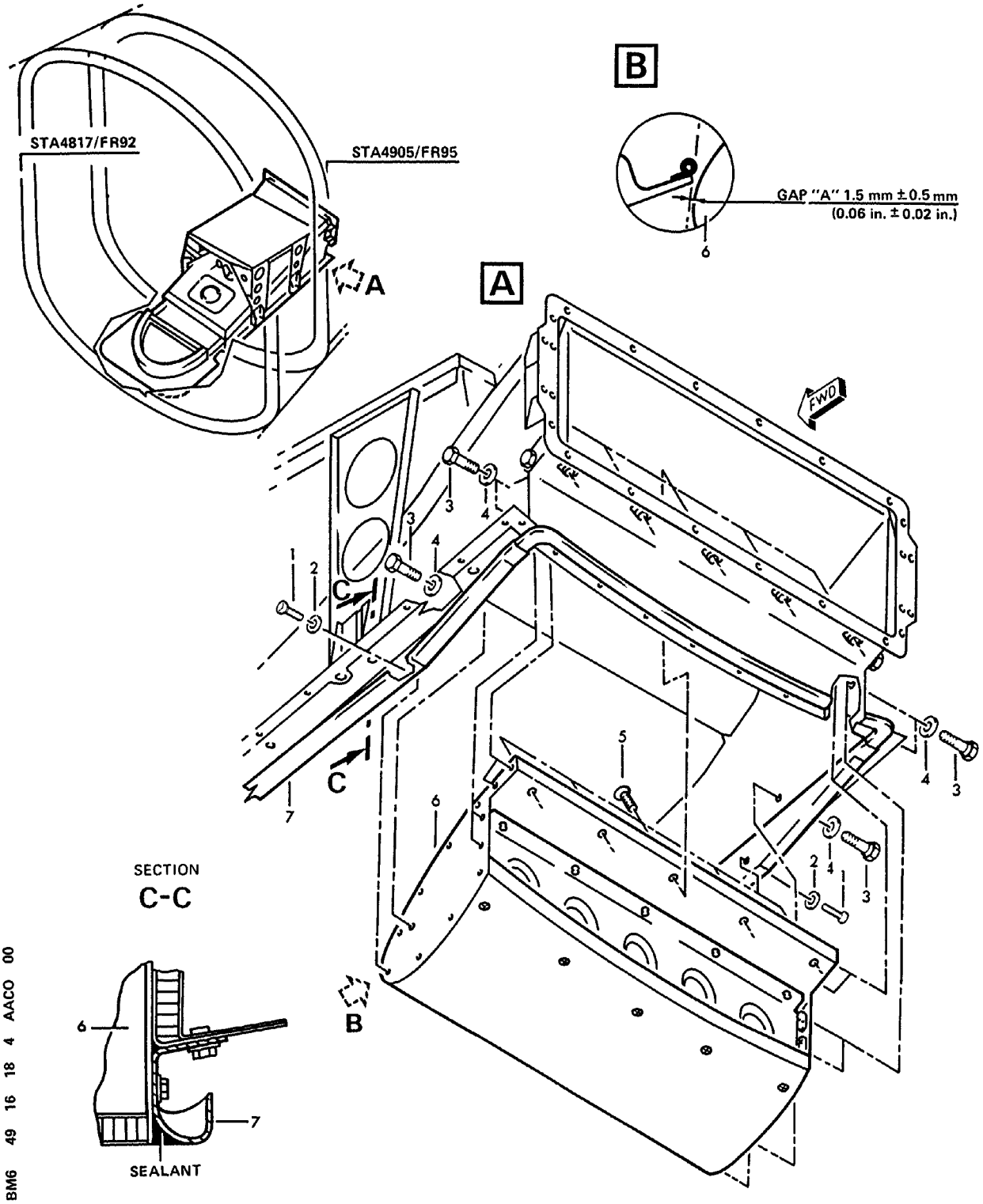
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(3)On APU panel 429VU:
(a)Place APU MASTER SW to OFF position.
(4)Position access platform and open access doors 313AL, 315AL and 316AR.

B. Removal
(Ref. Fig. 401)
(1)Remove inlet duct (Ref. 49-16-14, P. Block 401).
NOTE : Removal/installation procedure of air intake lip is possible with inlet duct installed. However access to attachments is limited.
(2)Remove screws (1) and washers (2).
(3)Remove screws (5).
(4)Remove bolts (3), washers (4) and air intake lip (6).
(5)Remove sealant from air intake lip (6) and gutter strips (7) (Ref. 51-76-10, P. Block 801).

C. Installation
(1)Visually inspect air intake lip (6) for damage. Replace if necessary.
(2)Make certain that installation area is clean and clear of tools and miscellaneous items of equipment.
(3)Position air intake lip (6) and install washers (4) and bolts (3). Do not tighten at this stage.
(4)Install screws (5) but do not tighten at this stage.
(5)Install washers (2) and screws (1).
(6)Tighten screws (5) alternately.
(7)Tighten bolts (3) alternately.
(8)Fill gaps between air intake lip (6) and gutter strips (7) with sealant (Mat. No. 09-019). Apply nylon coating (Mat. No. 16-003) to sealed areas (Ref. 51-76-10, P. Block 801).
(9)Carry out adjustment/test of air intake flap actuator (Ref. 49-16-12, P. Block 201) to make certain that gap 'a' between air intake lip (6) and air intake flap is 1.5 mm ±0.5 mm (0.06 in. ±0.02 in.).
(10)Install inlet duct, if removed (Ref. 49-16-14, P. Block 401).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 316AR, 315AL and 313AL and remove access platform.
CAUTION : MAKE CERTAIN THAT TRAVEL RANGE OF AIR INTAKE FLAP IS CLEAR, BEFORE CLOSING CIRCUIT BREAKERS.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KB, 1KD, 2KD,58KD and 71KD.

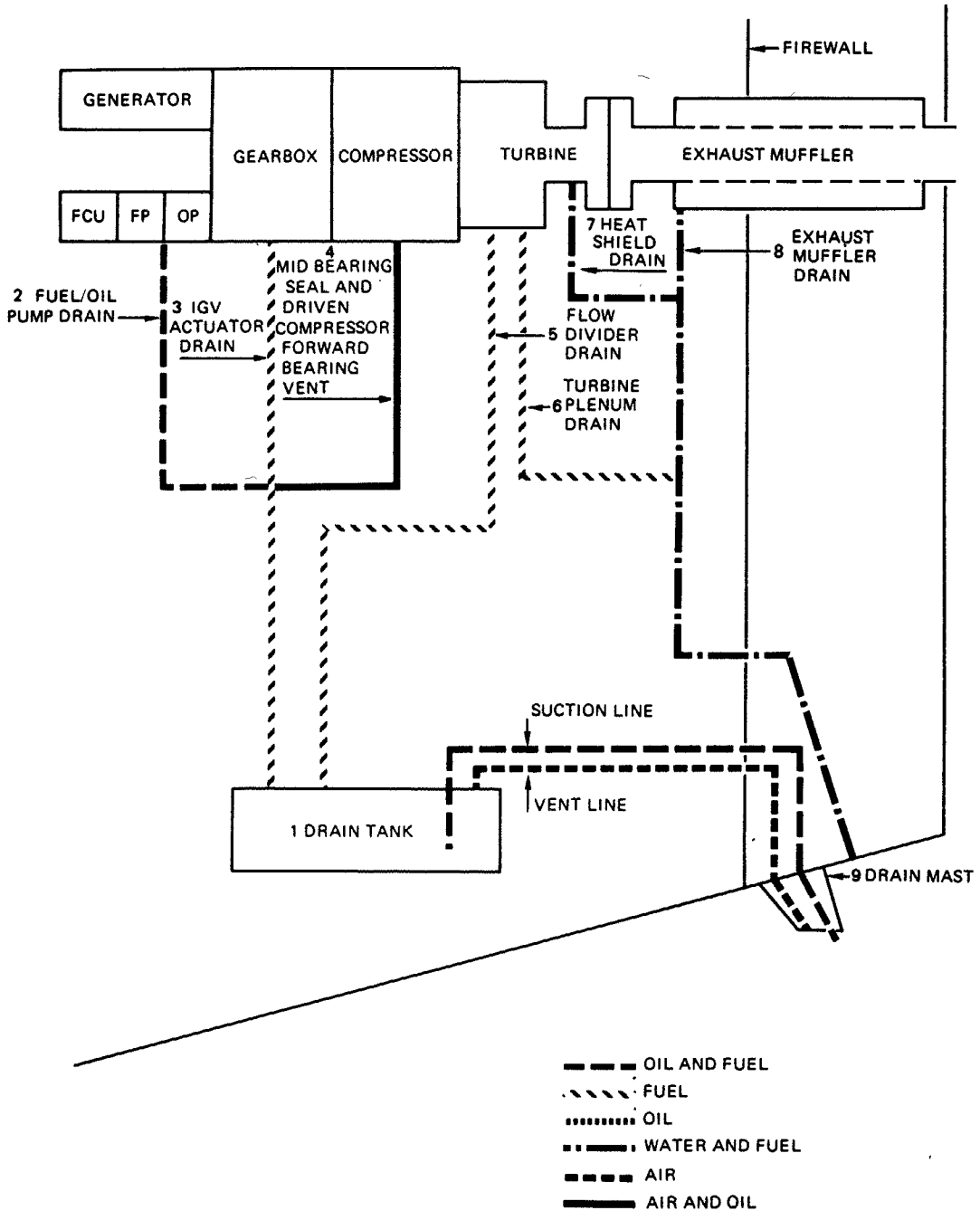


Air Intake Lip
Figure 401

1. General
(Ref. Fig. 001)
A drain system is installed in the APU where it is necessary to evacuate fuel, oil, water and air. It prevents the possibly harmful accumulation of liquids in the APU bay. Water drains are run directly to the atmosphere. Fuel, oil and air drains are routed to a drain tank. The drain tank is exhausted by a suction line through the external drain mast which operates in flight at speeds above 200 knots.

2. Component Location
(Ref. Fig. 002)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	DRAIN TANK		315	315AL 316AR	49-17-11
	FUEL/OIL PUMP DRAIN		316	315AL 316AR	49-32-11
	IGV ACTUATOR DRAIN		315	315AL 316AR	49-23-13
	MID BEARING SEAL AND DRIVEN		315 316	315AL 316AR	49-10-00
	COMPRESSOR FORWARD BEARING VENT FLOW DIVIDER DRAIN		316	315AL 316AR	49-32-12
	TURBINE PLENUM DRAIN		315 316	315AL 316AR	49-10-00
	HEAT SHIELD DRAIN		315 316	315AL 316AR	49-10-00
	EXHAUST MUFFLER DRAIN		315 316	315AL 316AR	49-81-15
	DRAIN MAST		317	317AL	49-17-12



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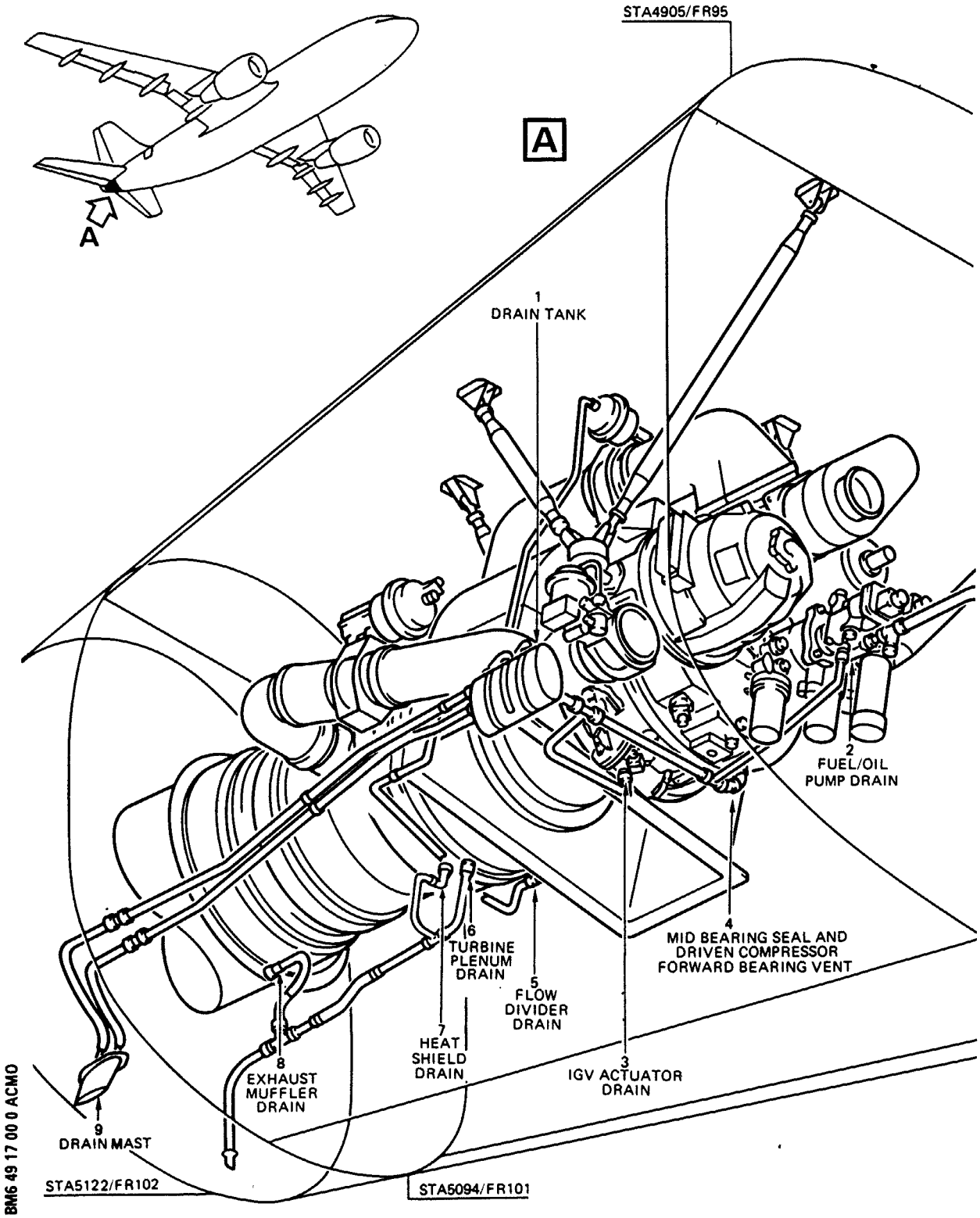
Drain System - Schematic
Figure 001



Drain System - Component Location
Figure 002

3. Description

The fuel/oil pump drain (2), IGV actuator drain (3) and the mid bearing seal and load compressor forward bearing drain (4) lines are routed via a collector line into the drain tank (1). The flow divider drain (5) is routed directly to the tank. The drain tank is fitted with a drain plug for manual draining. For venting and evacuation, the drain tank is connected to the drain mast (9) by a vent and a suction line.

The turbine plenum drain (6), the heat shield drain (7) and exhaust muffler drains (8) are routed directly to atmosphere via a separate collector line.

All components used in the APU compartment are manufactured from fireproof material.

At the lowest point of the APU compartment (designated fire zone), behind the front fire wall FR95, there is a second drain mast installed which drains all liquids present in the compartment, such as condensed water, deicing and cleaning agents and leakage due to APU or component defects, direct to atmosphere.

Both drain masts are located in zones where overboard drainage does not constitute a danger to the APU or other components.

DRAIN TANK - REMOVAL/INSTALLATION

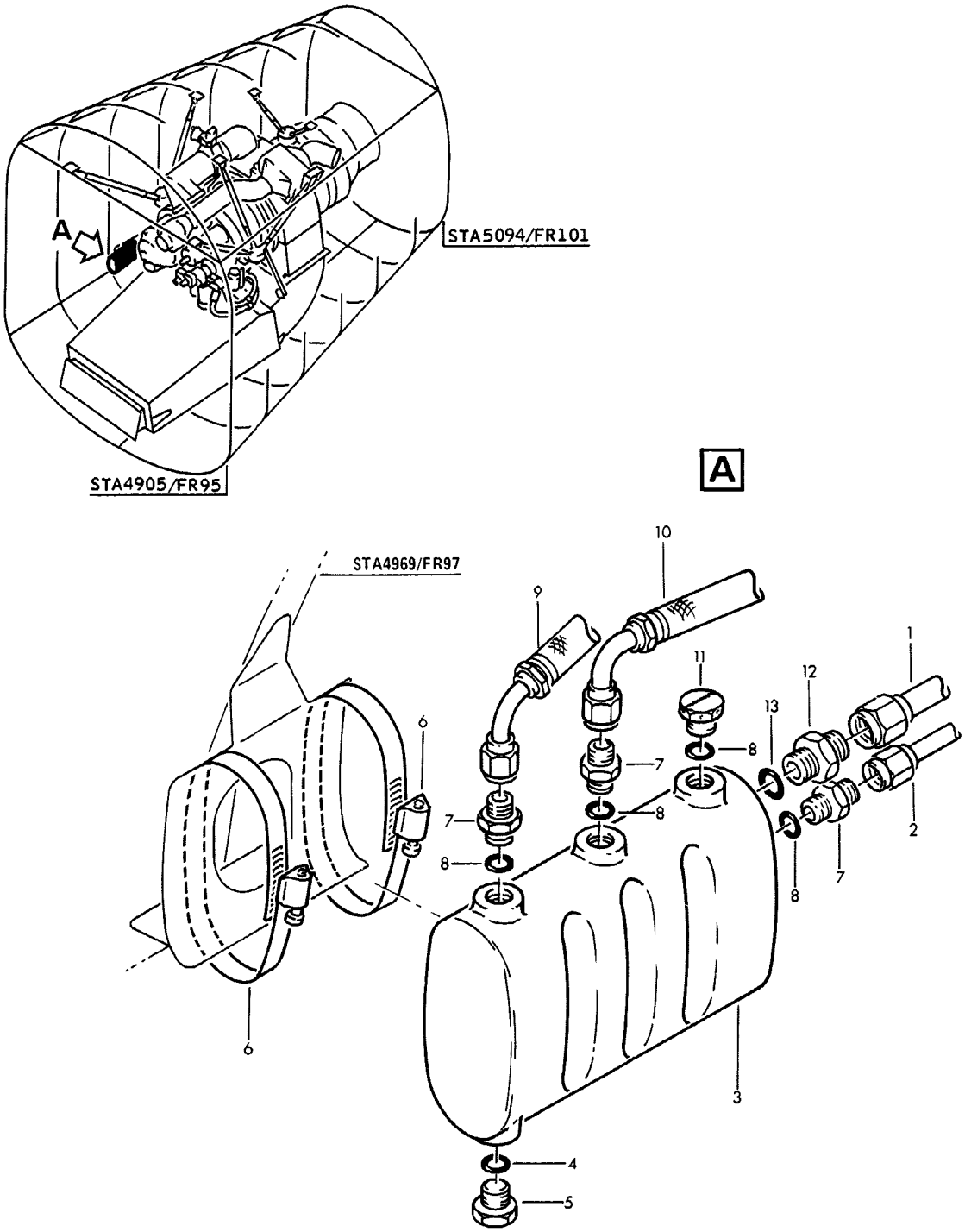
WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

1. Equipment and Material

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Saftey Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 1.0 mm (0.04 in.) dia.
D.	Container, 2 l (0.53 US gal.) Capacity
E.	O-Rings
F.	Blanking Caps and Plugs

2. Procedure

(Ref. Fig. 401)



Drain Tank
Figure 401

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A51
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

B. Removal

NOTE : Fit blanking caps and plugs to disconnected lines.

(1)Position container, remove lockwire and plug (5)
  (a)Remove and discard O-ring (4).
(2)Empty drain tank.
(3)Disconnect collection drain line (9), flow divider drain line (10), suction line (2) and vent line (1) from drain tank unions (7, 12).
(4)Release clamps (6) and remove drain tank (3).

C. Preparation for Installation

(1)Check drain tank (3) for damage, dents, chafing and cracks.
  (a)Replace, if necessary.
(2)Remove plug (11) and unions (7, 12).
  (a)Remove and discard O-rings (8, 13).
  (b)Install new O-rings (8, 13), unions (7, 12) and plug (11) on to drain tank.
  (c)Safety plug (11) with lockwire to union (12).

D. Installation

NOTE : Remove blanking caps and plugs from lines before connection.

(1)Position drain tank (3) and clamps (6). Do not tighten at this stage.
(2)Connect vent line (1), suction line (2), flow divider drain line (10) and collection drain line (9).
(3)Make certain that installation is tension free.
(4)Tighten clamps (6).
(5)Position new O-ring (4), install plug (5).
  (a)Safety plug (5) with lockwire.
(5)Remove container.

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 71KD, 10QC and 11QC.

DRAIN MAST - REMOVAL/INSTALLATION

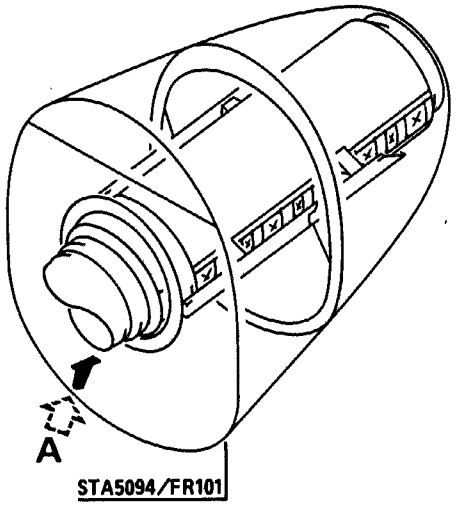
WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

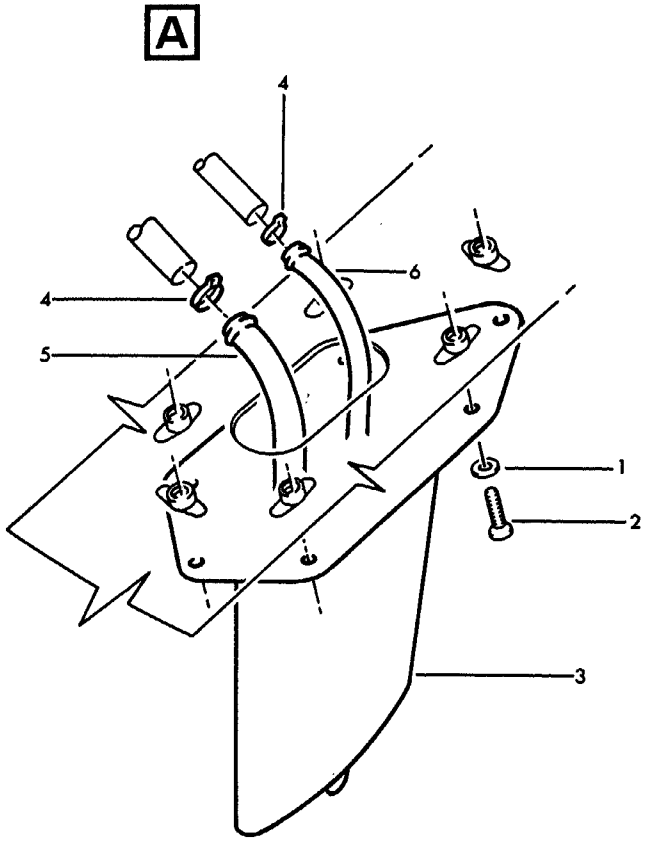
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Plugs
C.	Circuit Breaker Safety Clips and Tags
D. Material No. 05-013	Special Materials (Ref. 20-31-00)
E. Material No. 05-027	Special Materials (Ref. 20-31-00)
F. Material No. 09-001	Sealants (Ref. 20-31-00)
G. Material No. 11-003	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 51-75-10, P. Block 801	Repair of Paint Coatings

2. Procedure
(Ref. Fig. 401)





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Drain Mast
Figure 401

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open rear access fairing 317AL.

B. Removal
(1)Release clamps (4), disconnect ventline (5) and suction line (6) and fit blanking plugs.
(2)Remove screws (2), washers (1) and drain mast (3).
WARNING : CLEANING AGENT (MAT. NO. 11-003) IS DANGEROUS.
(3)Remove sealant remnants from drain mast and fuselage connecting surfaces, using cleaning agent (Mat. No. 11-003),
(a)Check for damage, cracks and corrosion.

C. Installation
(1)Apply separator agent (Mat. No. 05-013) to fuselage connecting surfaces.
(2)Apply sealant (Mat. No. 09-001) to drain mast flange.
(3)Position drain mast (3) and install washers (1) and screws (2).
(4)Remove blanking plugs, connect ventline (5) and suction line (6) and secure with clamps (4).
(5)Apply sealant fillet (Mat. No. 09-001) to drainmast/fuselage joint.
(6)Apply moisture-removing oil (Mat. No. 05-027) thinly to structure interior at drain mast flange area (Ref. 51-75-10, P. Block 801).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close rear access fairing 317AL and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA , 1KD and 71KD.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 7 m (23 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Container 2.0 l (0.52 US gal.)
D. Material No. 01-002	Fuel (Ref. 20-31-00)
or	
E. Material No. 01-003	Fuel (Ref. 20-31-00)

2. Procedure

A. Job Set-Up
(1)Make certain APU Master Switch is OFF.
(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/CTL	71KD	B53

(3)Position access platform and open access doors 315AL and 316AR.

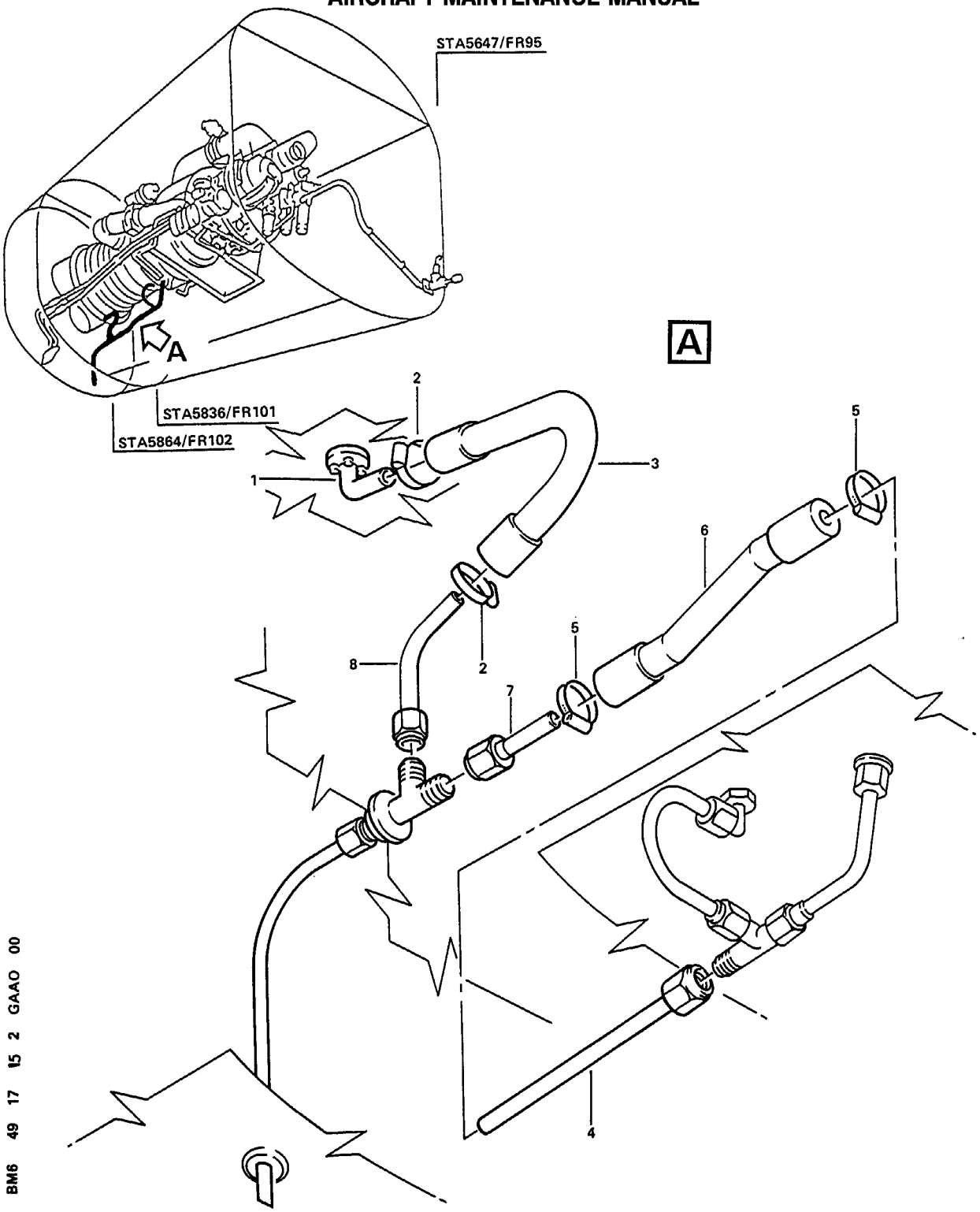
(Ref. Fig. 201)

B. Removal (Ref. Fig. 201)
(1)Loosen clamps (2) and remove hose (3) from engine fitting (1) and tube (8).
(2)Loosen clamps (5) and remove hose (6) from tubes (4) and (7).
NOTE : A container should be positioned to collect fuel, any fuel present on removal of flexible hoses is evidence of blockage.

C. Inspection
(1)Inspect hoses (3) and (6) for blockage, internal deterioration, porosity, hardening, cracking and/or splitting.
(2)Clear any blockage or replace damaged or deteriorated hose(s).

D. Installation
CAUTION : WHEN INSTALLING DRAIN HOSES, MAKE CERTAIN THAT THE INTERNAL LINING IS NOT DAMAGED OR PUSHED IN.
(1)Loosely install clamps (2) on hose (3).
(2)Internally lubricate hose (3) using fuel (Mat. No. 01-002 or 01-003).
(3)Install hose (3) on engine fitting (1) and tube (8), tighten clamps (2).
(4)Loosely install clamps (5) on hose (6).
(5)Internally lubricate hose (6) using fuel (Mat. No. 01-002 or 01-003).
(6)Install hose (6) on tubes (4) and (7), tighten clamps (5).

E. Close Up
(1)Make certain working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR, remove access platform.
(3)Remove safety clips and tags, close circuit breakers 50KA, 1KD and 71KD.



Turbine Plenum and Exhaust Drain System
Figure 201

1. General (Ref. Fig. 001)

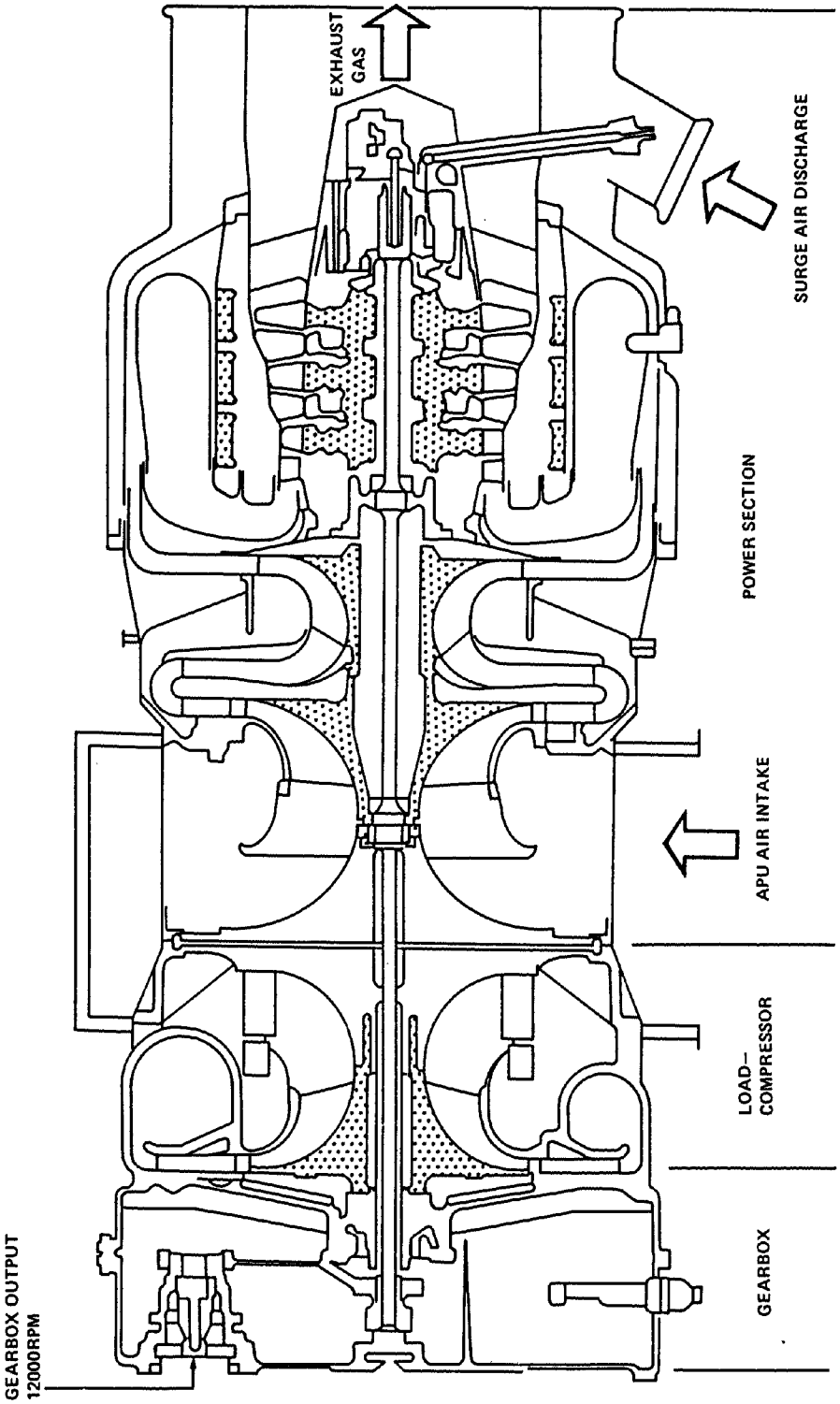
The Model GTCP 331-250F and GTCP 331-250H Auxiliary Power Unit (APU), manufactured by Air Research Manufacturing Division of Garrett Turbine Engine Company as well as the Electronic Control Box (ECB), is designed to function as a combination shaft power and pneumatic energy source for flight and ground operation. The APU consist of three basic modules - power section, load compressor, and accessory gearbox. The APU also incorporates accessories required to control, protect, and perform functions that permit the APU to deliver energy within the required parameters.

2. Description

A. Power Section
The power section provides shaft power to drive a load compressor, a gearbox with attendant accessories and an electrical generator. It is designed on the single-shaft principle, with a two-stage centrifugal compressor, a reverse flow annular combustion chamber and a three-stage axial turbine as the main components.

B. Load Compressor (Ref. 49-23-00, P. Block 1)
The load compressor is a direct-drive modular assembly located between the power section and gearbox. It is designed as a single-stage centrifugal compressor. The output to the aircraft system is controlled by modulating inlet guide vanes at the entrance of the compressor housing.

C. Accessory Gearbox (Ref. 49-26-00, P. Block 1)
The gearbox is attached to the load compressor and is also driven by the power section. The AC generator, the starter motor, oil pump, fuel control, and cooling air fan assembly are mounted on the gearbox.



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Auxiliary Power Unit
Figure 001

3. Physical and Operational Characteristics

A. Overall Dimensions (approx.)
(1)Length - 57 in. (1448 mm)
(2)Width - 32 in. (813 mm)
(3)Height - 30 in. (762 mm)
(4)Dry Weight, engine and electronic control unit (less customer-furnished equipment) - 488 lb. (221 kg)

B. Operating Limits
(1)Bleed Load - sea level 103F condition - 236 lb/min 42 psia
(2)Shaft Load - sea level 103F condition - 170 shp max.
(3)Turbine Discharge Temperature (governed speed, absolute maximum) - 585°C (1085°F)
(4)Turbine Discharge Temperature (at rated combination load), maximum - 566°C (1050°F)
(5)Turbine Discharge Temperature during Acceleration - 899-C (1650-F)
(6)Output Shaft Speed:
Generator - 12,000 RPM

C. Fuel and Fuel Control System
(1)Fuel Specification - MIL-T-5624, Grade JP4, Type A1, (ASTM) (D1655-68)
Jet A or Jet B MIL-T-5624, Grade JP5, Type A1
(2)Fuel Inlet Pressure - min. 10 psia above true fuel vapor pressure,
- max. 55 psig.
(3)Recommended Customer-Furnished Fuel
Boost Pump Setting - 30 ±5 psig
(4)Fuel Inlet Temperature - Grade JP4, Type A1 from -40°C (-40°F) to 54°C (130°F)
- Grade JP5, Type A1 from -40°C (-40°F) to 54°C (130°F)

D. Starter Duty Cycle (Starting Operation)
(1)Below 37000 feet (11278 m)
3 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 3rd attempt the starter motor must cool down for at least 60 minutes.
(2)Above 37000 feet (11278 m)
5 consecutive start attempts are allowed, with a minimum of 1 minute cool down between each attempt. After the 5th attempt the starter motor must cool down for at least 60 minutes.

E. Lubrication System
(1)Oil Specification (Ref. 20-31-00)
(2)Oil Reservoir Capacity - 5.7 l. (6.0 US qt.) approx.
(3)Oil Consumption (10 hours operation) - 10 ccm/per hour max.
(4)Electrical System
Power Supply (aircraft bus) or
Battery Starting Only - 28.6 ± 2V DC

F. Bleed-Air Control System
  (1)Inlet Guide Vane Actuator - Nonoperating - Closed
  (2)Surge Valve - Nonoperating - Open
  (3)Load Valve - Normal Position - Closed

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, PROTECT EYES AND SKIN. USE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

CAUTION : DO NOT EXCEED STARTER MOTOR DUTY CYCLE OF THREE CONSECUTIVE START ATTEMPTS WITH A 60 MINUTE COOLING PERIOD PRIOR TO ADDITIONAL START ATTEMPTS.

1. General

A. The preservation procedure of the APU is carried out to prevent internal and external corrosion and deterioration when the APU is not in service. Depending on climatic conditions the periods of inspection for the preserved APU will vary.
The preservation procedure will give the maximum protection and must be carried out in clean and dry conditions. The ingress of moisture and contamination must be avoided as this will cause corrosion.
Storage times and procedures are given in Table 301.

B. Before the APU is removed from the aircraft for storage or overhaul, the fuel system must be preserved.
When operation of the APU is not possible, the fuel must be drained from the fuel control unit and the unit filled with preservation oil.

Table 301 APU Preservation Procedure

Storage Period	Installed Engines	Engine to be Removed from Aircraft for Maintenance and/or Storage
One to 45 days	At the beginning of the period of idleness, operate engine at no load governed speed for 5 minutes minimum. NOTE : It is sufficient if the APU has been operated within the last 24 hours. Cover or plug openings to prevent entrance of water or foreign matter.	Remove engine and install caps and covers in accordance with paragraph 2. B. (3) steps (a through c).
45 to 180 days	At the beginning of the period of idleness, operate engine at no load governed speed for 5 minutes minimum. Perform preservation procedure in accordance with paragraph 2. B.(2).	Perform preservation procedure, remove engine and perform storage procedure in accordance with paragraph 2. B. (2) and 2. B. (3)
More than 180 days	If engine is not to be returned to operating status, it is recommended that engine be removed from the aircraft; preserved and stored.	Perform preservation procedure, remove engine and perform storage procedure in accordance with paragraph 2. B. (2) and 2. B. (3)

2. Preservation and Storage

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Desiccant MIL-D-3464
(4)	Humidity Indicator (MS 20003)
(5)	Vapor-proof barrier material bag MIL-B-131B
(6)	Blanking Caps and Plugs
(7)	Protective Covers
(8)	Warning Tag (S 8145-26A)
(9)	Container, 10 l (2.5 US gal.)
10)Material No. 03-002	Oils (Ref. 20-31-00)
or	
11)Material No. 03-003	Oils (Ref. 20-31-00)
12)Material No. 03-008	Oils (Ref. 20-31-00)
13)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
(14)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 24-23-11, P. Block 401	APU AC Generator (8XS)
- 24-41-00, P. Block 301	AC External Power Control
- 49-10-00, P. Block 401	Power Plant
- 49-10-00, P. Block 501	Power Plant
- 49-31-12, P. Block 201	Primary Fuel Manifold and Nozzle
- 49-31-14, P. Block 301	Fuel Filter
- 49-32-11, P. Block 401	Fuel Control Unit
- 49-41-11, P. Block 401	Ignition Unit
- 49-91-12, P. Block 201	Oil Filter

B. Procedure

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform.

(c)Open access doors 315AL and 316AR.

(d)Position container.

1 Disconnect flow divider tube from inlet port of flow divider.

2 Disconnect primary manifold and allow fuel to drain.

3 Connect flow divider tube to inlet port of flow divider.

(Ref. 49-31-12, P. Block 201).

CAUTION : DO NOT INTRODUCE FUELS OR OILS INTO THE COMPRESSOR SECTION AS UNCONTROLLED COMBUSTION MAY OCCUR.

(2)Preservation

WARNING : MAKE SURE THAT THE CIRCUIT BREAKERS 50KA, 71KD AND 1KD

R ARE OPEN, SAFETIED AND TAGGED, WHEN YOU WORK AT THE APU.

NOTE : Use of a corrosion-preventive mixture in the engine lubrication system is not required. Engine lubrication oil is a satisfactory corrosion-preventive.

(a)Disconnect LP fuel line at fuel boss (Ref. 49-32-11, P. Block 401).

(b)Disconnect and cap ignition unit low voltage input lead (Ref. 49-41-11, P. Block 401).

(c)Connect a supply of fuel control preservative oil (Mat. No. 03-008), to fuel inlet connection and pressurize.

(d)Connect electrical ground power unit and energize aircraft electrical network. (Ref. 24-41-00, P. Block 301).

(e)Make certain that electronics racks ventilation is correct.

(f)Remove safety clips and tags and close circuit breakers 50KA, 1KD and 71KD.

CAUTION : DO NOT EXCEED STARTER MOTOR DUTY CYCLE OF THREE CONSECUTIVE START ATTEMPTS WITH A 60 MINUTES COOLING PERIOD PRIOR TO ADDITIONAL START ATTEMPTS:

(g)To rotate engine and allow preservation oil to flow overboard from primary fuel manifold proceed as follows:

- On APU panel 429VU, place APU master switch to ON position.
- On APU panel 429VU, press START button.

(h)Open, safety and tag circuit breakers 50KA, 1KD and 71KD.

(j)De-energize aircraft electrical network and disconnect ground power unit (Ref. 24-41-00, P. Block 301).

(k)Connect primary and secondary fuel supply lines.

(l)Remove cap and connect igniter unit low voltage input lead.

(m)Remove supply of preservation oil from fuel control and connect LP fuel supply line.

WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.

(n)Clean excess fuel and oil from engine and APU compartment with cleaning agents (Mat. No. 11-002).

(p)Fit blanks and covers to air inlets and outlets.

(q)Secure warning tag in the flight compartment, indicating that APU has been preserved.

(r)Remove container.

(3)Storage

(a)Remove APU from aircraft (Ref. 49-10-00, P. Block 401).

R

R

CAUTION : USE PLASTIC CAPS OR PLUGS ON ALL FUEL OR LUBRICATION SYSTEM COMPONENTS. DO NOT USE TAPE, CLOTH, OR ALUMINUM CAPS AND PLUGS.

(b)Plug, cap or seal all external pressure ports, fittings and all other openings on the engine.

WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.

(c)Remove fuel and oil from exterior of engine with cleaning agent (Mat. No. 11-002).

(d)Remove AC generator (Ref. 24-23-11, P. Block 401).

(e)Attach warning tag (S 8145-26A) to engine to indicate that engine is preserved.

(f)Place engine in vapor-proof barrier material bag (Mil-B-131B).

(g)Place desiccant (Mil-D-3464) and humidity indicators (MS 20003) in the bag and storage container.

(h)Place the engine in a storage container.

(i)Check storage container humidity indicator every 30 days.

NOTE : The humidity indicator shall be checked by comparison, with the color comparison chart shown on indicator (MS 20003). If check reveals that the humidity indicator is in fully activated condition with the relative humidity less than 40 percent, no further maintenance shall be required until the next check.

NOTE : When a check reveals that the relative humidity is 40 percent or above, an unsafe or corrosive condition may exist. The bag shall be opened and engine removed and checked to determine its serviceability. Return engine to the maintenance facility if corrosion is found in the engine. If the engine is serviceable comply with paragraph 2. B. (4) step (f) through (j).

(4)De-preservation

(a)Make certain that generator or cover plate is securely attached.

(b)Make certain that the engine oil level is correct.
For list of approved oils Material No. 03-002 or 03-003 (Ref. 12-13-49 P. Block 1).

(c)Make certain that the A/C fuel level is sufficient for operation of the APU.

(d)Check oil filter elements for contamination, replace if necessary (Ref. 49-91-12, P. Block 201).

(e)Check fuel filter element for contamination, replace if necessary (Ref. 49-31-14, P. Block 301).
(f)Connect electrical power and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).
CAUTION : DO NOT EXCEED STARTER MOTER DUTY CYCLE OF THREE CONSECUTIVE START ATTEMPTS WITH A 60 MINUTES COOLING PERIOD PRIOR TO ADDITIONAL START ATTEMPTS.
(g)Start and operate APU at no-load governed speed for a minimum time of five minutes. (Ref 49-10-00, P. Block 501).
(h)Shut down the APU.
(j)Recheck fuel filter element for contamination, replace if necessary. (Ref. 49-31-15, P. Block 301).
(k)Inspect APU for leaks and all applicable connections for locking.
(l)Recheck oil level.
(m)Return engine to normal operation.

(5)Close - Up
(a)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR.
(c)Remove access platform.

NOTE : This Inspection/Check contains procedures for the borescope inspection
R of the load compressor, engine compressor, combustor, heat shield
R thermocouple mount bosses and turbine bearing support assembly
R as required by the Troubleshooting Manual.

1. Inspect Load Compressor and Engine Compressor

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT. USE A TOOL WITH AN INSULATED HANDLE.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Cap and Plug
(3)	Circuit Breaker Safety Clips and Tags
(4)	Borescope, Olympus Model 1F6D-10, 6 mm (0.236 in.) dia. with 33 in. (838 mm) working length
(5)	Light Source, Olympus Model ILK-2 (View direct with 50-degree angle of vision. Flexible end with 240 degrees of travel)
(6)	Container, 2 l (0.52 US gal.) Capacity

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-16-14, P. Block 401	Inlet Duct

B. Procedure

(1)Job Set-Up

(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(c)Position access platform and open access doors 315AL and 316AR.

(2)Inspection
(a)Remove air inlet duct (Ref. 49-16-14, P. Block 401).
(b)Position container below inlet guide vane (IGV) actuator, disconnect actuator fuel pressure hose and drain fuel into container. Manually open IGV and fit blanking cap and plug. Remove container.
(c)Insert borescope through the inlet plenum screen into the load compressor or into the engine compressor and inspect for the following damage:
1 Remove the APU if any large leading or trailing edge blade pieces (25 % or greater) of total blade are missing.
2 Bent inducer blade leading edges are acceptable provided the bend does not exeed 25 % of the blade height.

3 Examine the guide vanes for evidence of foreign object damage (FOD). Bent or missing vanes are not permitted.
4 Check IGV connecting rod for cracks, bends, and galled or stripped threads. No cracks, bends or damaged threads are allowed.
5 Check IGV actuator mount for cracks, erosion, elongated bolts, elongated bolt holes and worn or damaged bushings. No cracks, erosion, elongated bolts, elongated bolt holes, worn or damaged bushings are allowed.
(d)Remove borescope.
(e)Remove blanking cap and plug and connect IGV actuator pressure hose.
(f)Install air inlet duct (Ref. 49-16-14, P. Block 401).
NOTE : If no abnormal conditions are observed in the compressor sections, continue with borescope inspection of the combustor section (Ref. Para. 2.).

(3)Functional Test
(a)Remove safety clips and tags and close the following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC and 71KD.
(b)Start and operate APU with no load (Ref. 49-10-00, P. Block 501), check IGV actuator fuel connection for leaks, then shut down APU.
NOTE : Leakage is not permissible.
(4)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform. (Ref. Fig. 601)

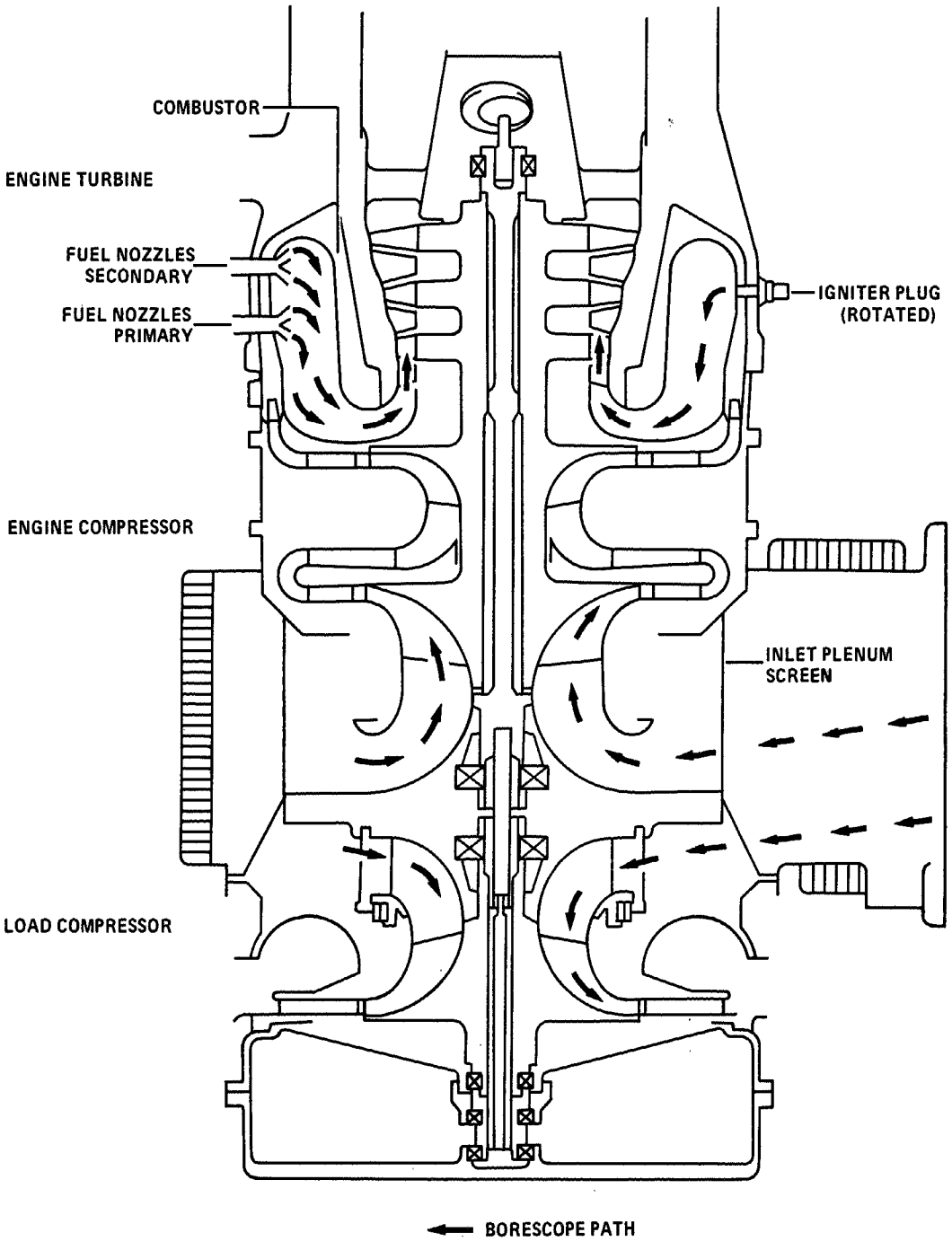
2. Inspect Combustor, Heat Shield and Heat Shield Thermocouple Mount Bosses

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT. USE A TOOL WITH AN INSULATED HANDLE.

A. Equipment and Materials

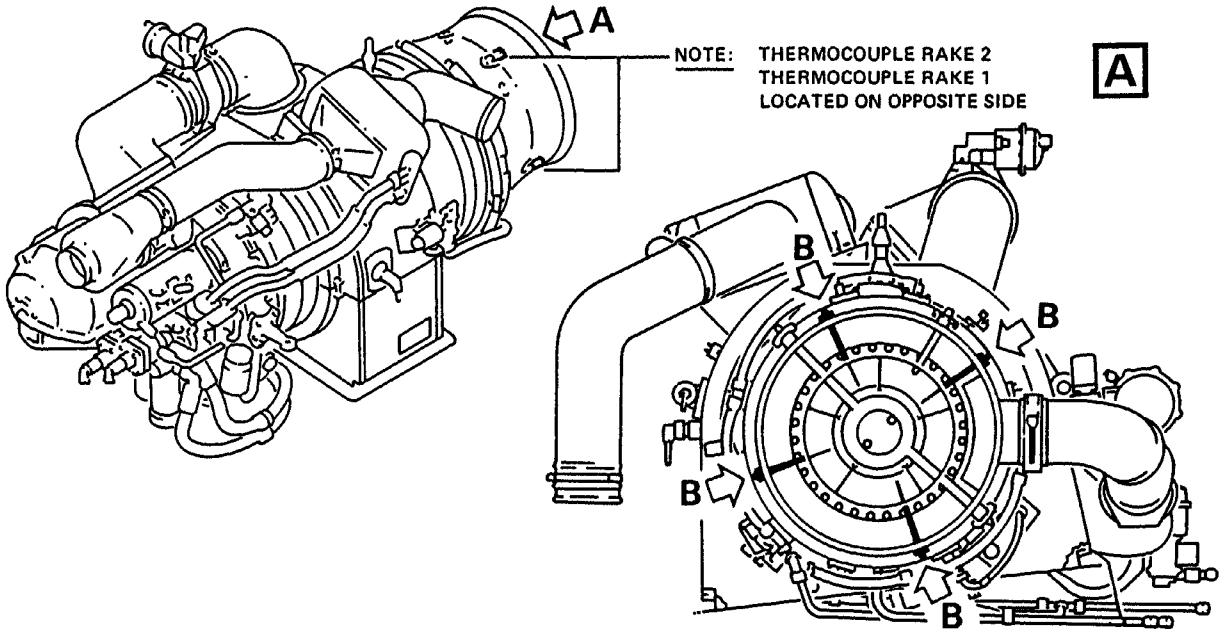
ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Borescope, Olympus Model IF6D-10, 6 mm (0.236 in.) dia. with 33 in. (838 mm) working length
(4)	Light Source, Olympus Model ILK-2 (View direct with 50-degree angle of vision. Flexible end with 240 degrees of travel)
(5)98A49007571001	Conduit - Borescope, APU
Referenced Procedures	
- 49-10-00, P. Block 501	Power Plant
- 49-31-12, P. Block 201	Primary Fuel Manifold and Nozzle
- 49-42-12, P. Block 201	Igniter Plug
- 49-72-11, P. Block 201	Exhaust Thermocouple
- 49-81-15, P. Block 401	Exhaust Muffler and Sealing Ring

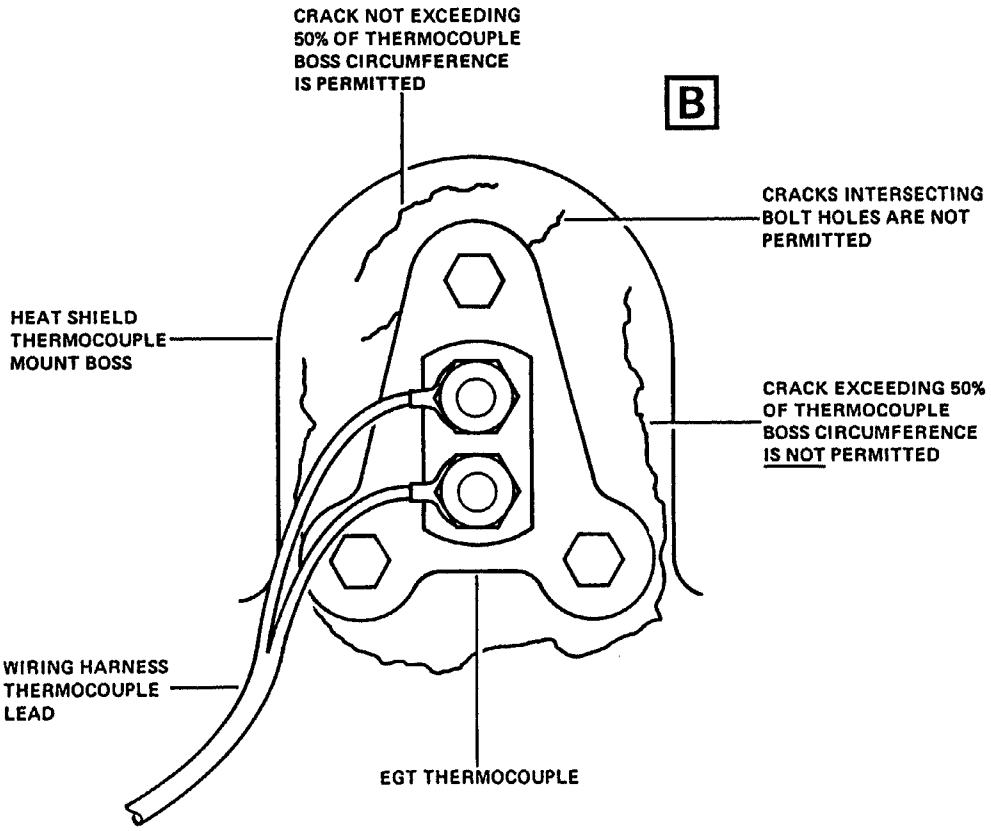


APU Borescope Inspection
Figure 601

B. Procedure (Ref. Fig. 602)
(1)Job Set-Up
(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57





BM6 49 20 00 6 ACMO 00

Heat Shield Thermocouple Mount Boss
Figure 602

(2)Inspection

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT. USE A TOOL WITH AN INSULATED HANDLE.

(a)Inspect combustor as follows.

1 Remove one of the fuel nozzles (Ref. 49-31-12, P. Block 201) or the igniter plug (Ref. 49-42-12, P. Block 201).

2 Install borescope conduit 98A49007571001.

3 Insert borescope through igniter port or fuel nozzle port.

4 Check combustor unit for the following conditions:

- Carbon deposits in excess of 0.25 in. (6.35 mm) require engine removal. (It is only visible through the nozzle port.)
- Cracks between dilution holes are permissible except where progression could cause material breakaway.
- R No intersection of cracks are permitted on the surfaces of outer R shell (louver). It is necessary the combustor removal for repair or R replacement.
- Distortion in excess of 0.25 in. (6.35 mm) requires combustor removal for repair or replacement.
- Oxidation spots larger than 1.0 in. (25.40 mm) diameter require repair or replacement of combustor.
- 0.25 in. (6.35 mm) minor stress relief cracks are permissible around the dilution holes.
- R No intersection of cracks are permitted on the surfaces of inner R shell. It is necessary the combustor removal for repair or R replacement.
- R Distortion of outer shell deflector (cooling skirt) by more than R 0.035 in. (0.89 mm) gap it is necessary for repair or replacement.

5 Remove borescope.

6 Remove borescope conduit 98A49007571001.

7 Install fuel nozzle (Ref. 49-31-12, P. Block 201) or igniter plug (Ref. 49-42-12, P. Block 201).

(b)Inspect heat shield thermocouple mount bosses for cracks (Ref. Fig. 602).

1 Remove exhaust thermocouples (Ref. 49-72-11, P. Block 201) and check cracks for following criteria:

- Cracks that do not exceed 50 percent of the heat shield thermocouple mount boss circumference are within acceptable limits.
- Cracks that exceed 50 percent of the heat shield thermocouple mount boss circumference must be repaired.
- Cracks intersecting any bolt holes are not permitted.

2 Install exhaust thermocouples (Ref. 49-72-11, P. Block 201).

(c)Inspect heat shield doubler band for cracks (Ref. Fig. 603).

1 Cracks more than 1.0 inch (25.4 mm) in length around the casing in the plane of the fuel nozzles are not acceptable.

(d)Inspect heat shield surge air "in" port for cracks (Ref. Fig. 604).

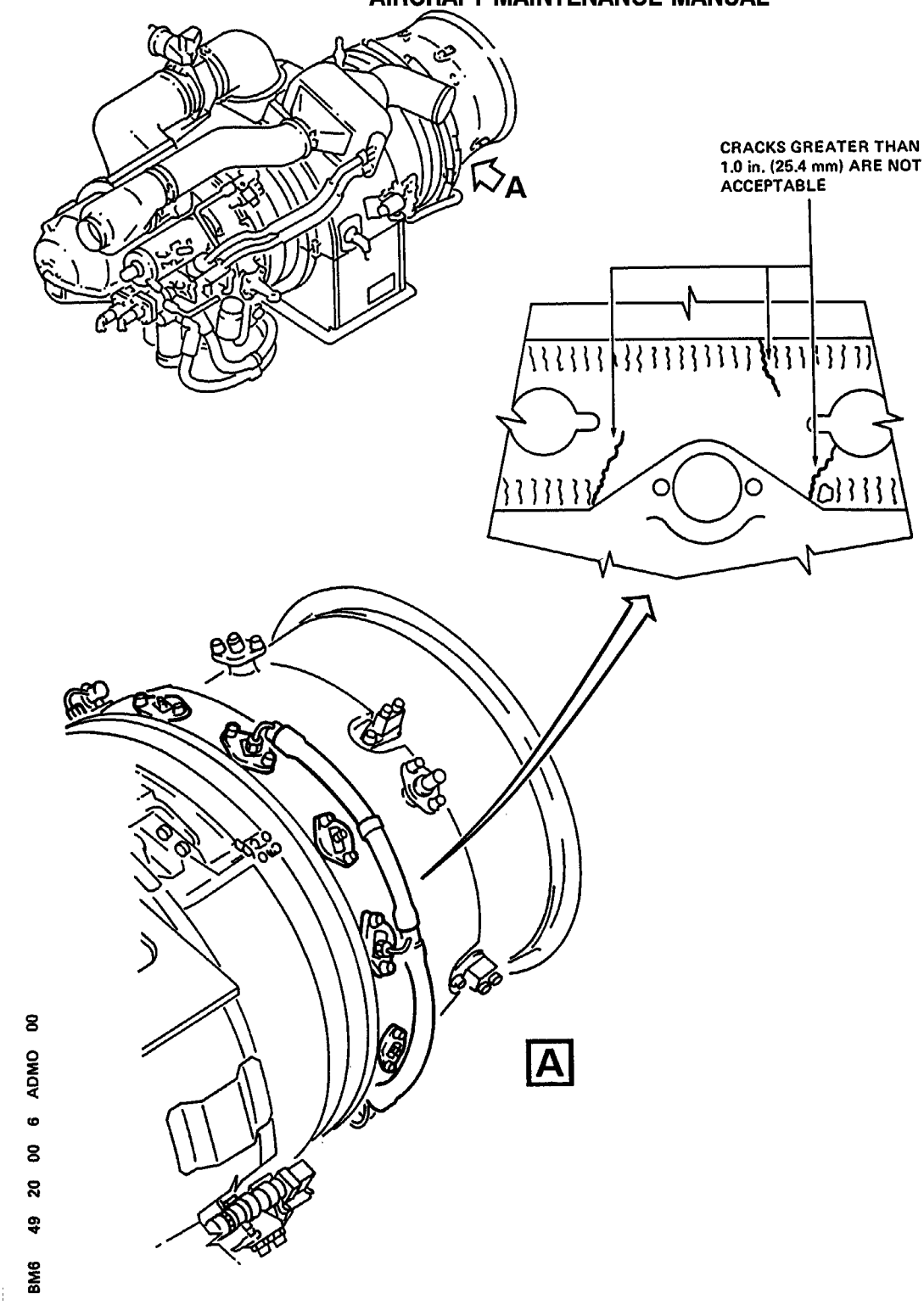
1 Intersecting cracks around the base of the surge air "in" port are not acceptable.

(e)Inspect heat shield surge air baffle.

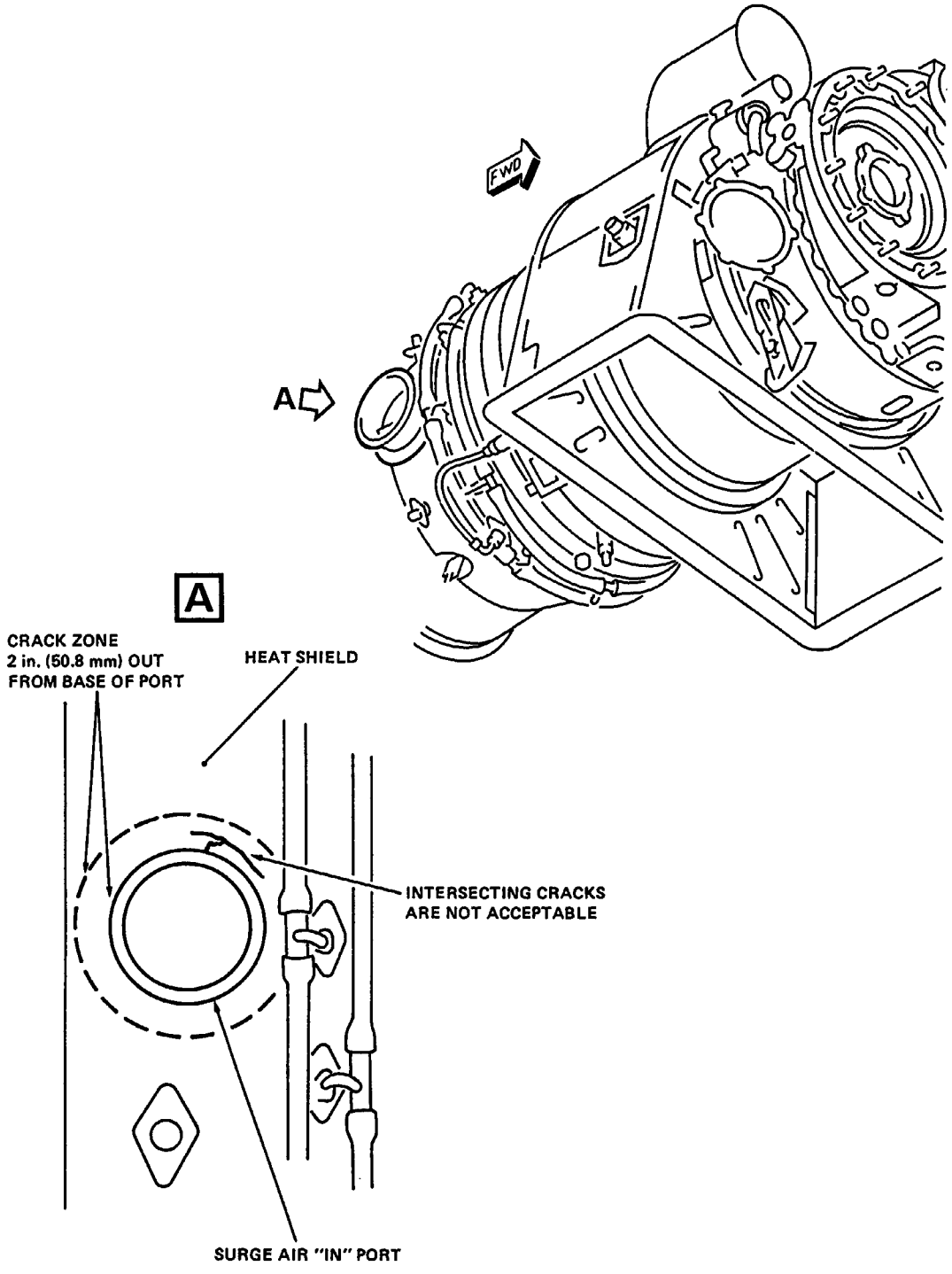
1 Remove the Exhaust Muffler (Ref. 49-81-15, P. Block 401).

2 Inspect the heat shield for cracks or pieces missing.
3 Cracking is acceptable and should be repaired at next shop visit.
4 Parts missing are not acceptable and APU must be replaced.

(Ref. Fig. 603)
(Ref. Fig. 604)



Heat Shield Doubler Band
Figure 603



Surge Air Duct "IN" Port
Figure 604

(3)Functional Test
(a)Remove safety clips and tags and close the following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC and 71KD.
(b)Start and operate APU with no load (Ref. 49-10-00, P. Block 501), and observe EGT indication.
(c)Check thermocouple attachment for air leakage.
(d)Check fuel nozzle for leaks.
NOTE : Leaks are not permissible.
(4)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

R 3. Inspect Turbine Bearing Support Assembly

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT. USE A TOOL WITH AN INSULATED HANDLE.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Borescope, Olympus Model 1F6D-10, 6 mm (0.236 in.) dia. with 33 in. (838 mm) working length
(4)	Light Source, Olympus Model ILK-2 (View direct with 50-degree angle of vision. Flexible end with 240 degrees of travel)

Referenced Procedures

- 49-16-14, P. Block 401	Inlet Duct
- 49-72-11, P. Block 201	Exhaust Thermocouple

B. Procedure
(Ref. Fig. 605)
(1)Job Set-Up
(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(c)Position access platform and open access doors 315AL and 316AR.
(d)Remove air inlet duct (Ref. 49-16-14, P. Block 401).
(e)Remove exhaust thermocouples (Ref. 49-72-11, P. Block 201).

(2)Inspection

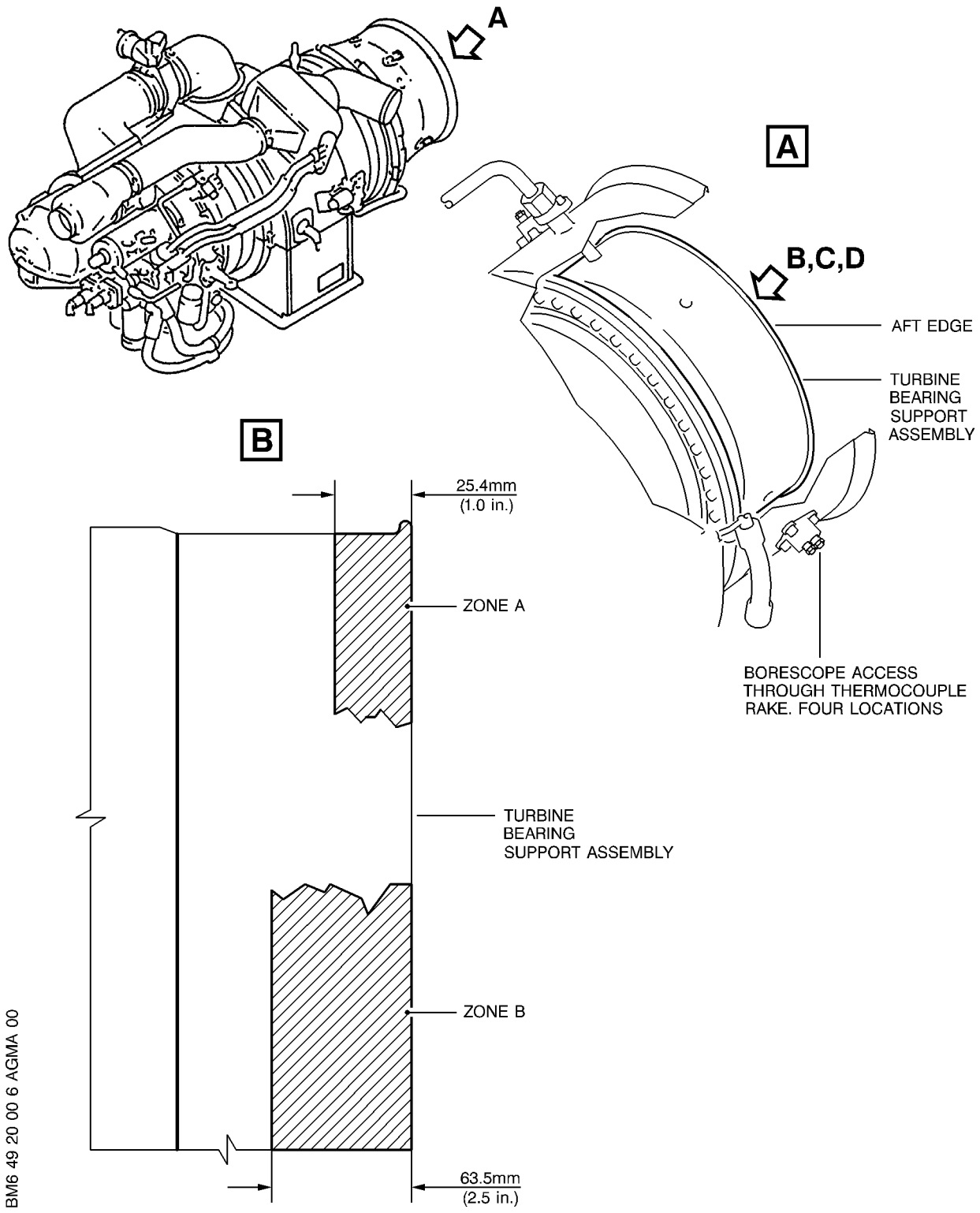
(a)Insert borescope through the holes of the thermocouples and inspect the turbine bearing support assembly for cracks.
1If cracks are found proceed as follows:

NOTE : Cracking and/or material loss of the sheet metal portion of the turbine bearing support assembly is acceptable for continued APU operation under the following criteria.

- All visible cracks are to be stop drilled.
- Cracks within 1.0 in. (25.4 mm) of the aft end of the sheet metal diffuser (Zone A) are to be blended to the full axial depth of the crack
  Blending shall be smooth and faired at the ends, with a blending radius equal to or greater than the axial depth of the crack
- Cracks or material loss may not extend beyond 2.5 in. (63.5 mm) from the aft end of the sheet metal diffuser (Zone B).
- Cracks within Zone B which run in a direction 30 degrees or less from the aft plane of the tailpipe are to be blended to remove any overhanging material.
- Two or more converging cracks in Zone B that are within 3.0 in. (76.2 mm) apart shall be blended to remove the material between the cracks.
- No overhanging material or sharp corners shall exist after blending or material removal.

(4)Close-Up
(a)Remove borescope.
(b)Install exhaust thermocouples (Ref. 49-72-11, P. Block 201).
(c)Install air inlet duct (Ref. 49-16-14, P. Block 401).

(d)Remove safety clips and tags and close the following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC and 71KD.
(e)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(f)Close access doors 315AL and 316AR and remove access platform.



Turbine Bearing Support Assembly
(Sheet 1 of 2)
Figure 605

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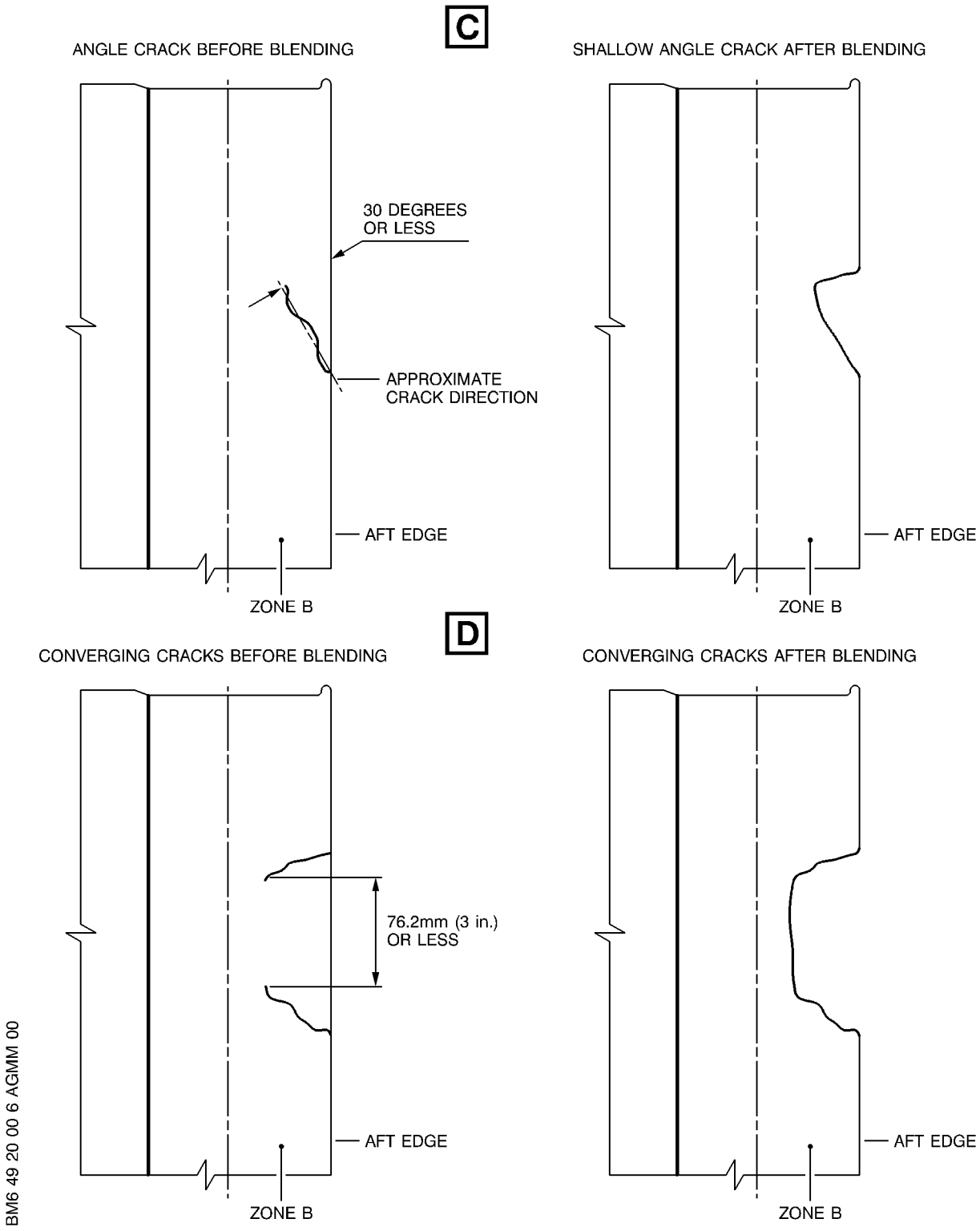

Turbine Bearing Support Assembly
(Sheet 2 of 2)
Figure 605

R

LOAD COMPRESSOR - DESCRIPTION AND OPERATION

1. General

The load compressor provides sufficient bleed air for the aircraft pneumatic system. The airflow is controlled by modulating the inlet guide vanes (IGV's). The load compressor output is regulated by the IGV's dependant on aircraft system demand (Ref. 49-51-00).

2. Component Location (Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	ACTUATOR - INLET GUIDE VANE		316	316AR	49-23-13
	SENSOR - LOAD COMPRESSOR INLET TEMPERATURE (LCIT)		316	316AR	49-23-12
	SENSOR - COMPRESSOR INLET PRESSURE (P2)		316	316AR	49-51-21

3. Description (Ref. Fig. 001)

A. The single-stage centrifugal compressor is driven directly from the power section.
The load compressor output is regulated by variable inlet guide vanes (IGV's) located upstream of the load compressor impeller.

B. The position of the IGV's is controlled by the ECB dependent on aircraft system demands (Ref. 49-61-00). The IGV's are moved to the correct position by a inlet guide vane actuator (IGVA), linkage, master gear, ring gear and each individual vane thru its sector gear.

C. The load compressor temperature in the scroll is monitored by the load compressor inlet temperature (LCIT) sensor.
The temperature signal is used by the ECB to provide input signals:
- For scheduling fuel for economical operation.
- To move IGV's into the open position during ECS mode.
- For the surge control system to prevent load compressor surge or stall.

D. The compressor inlet pressure sensor (P2) is a transducer that provides a signal to the ECB that correlates to pressure altitude. The signal from the P2 sensor is used:
- To modify the fuel schedule for economical operation.
- To provide a surge margin for the load compressor.

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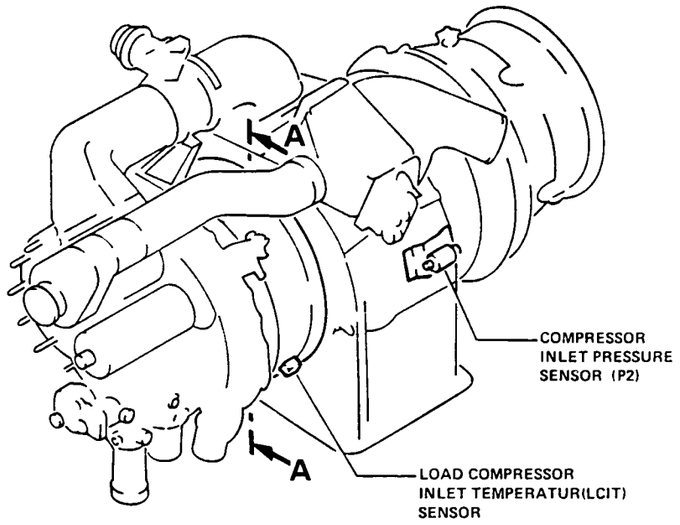

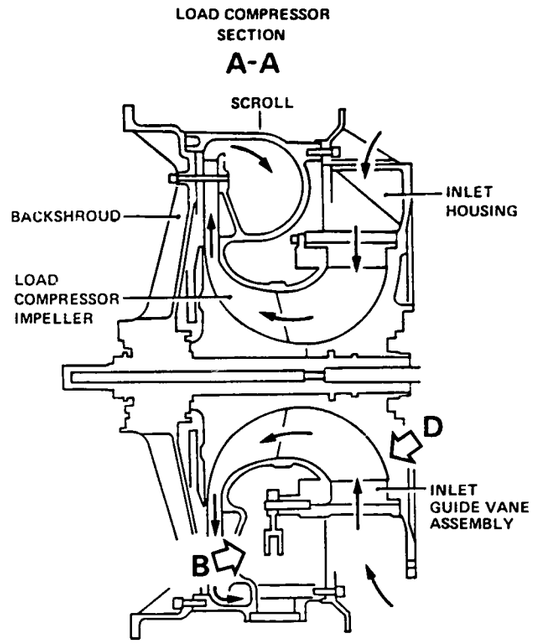

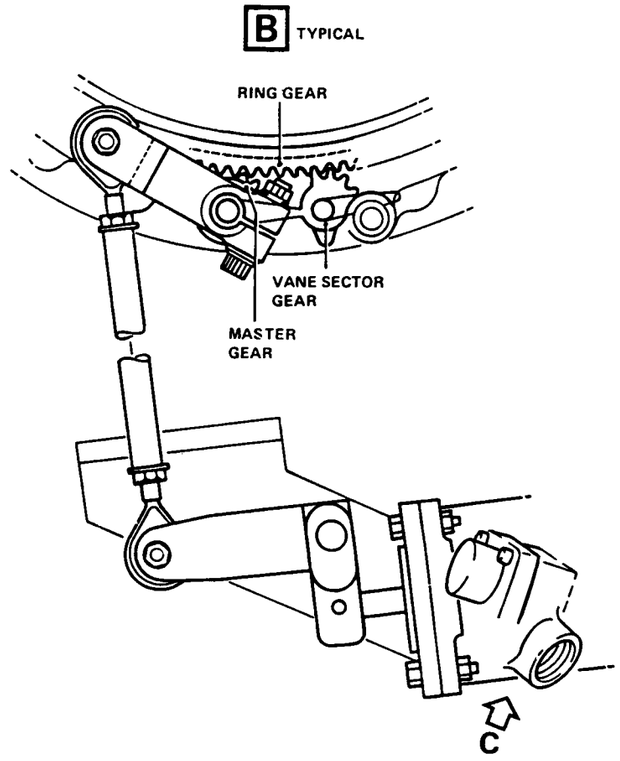

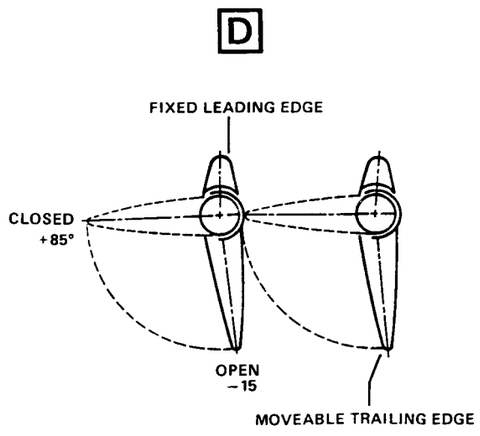

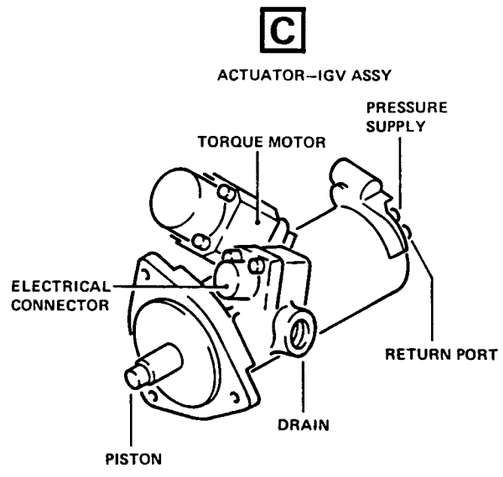

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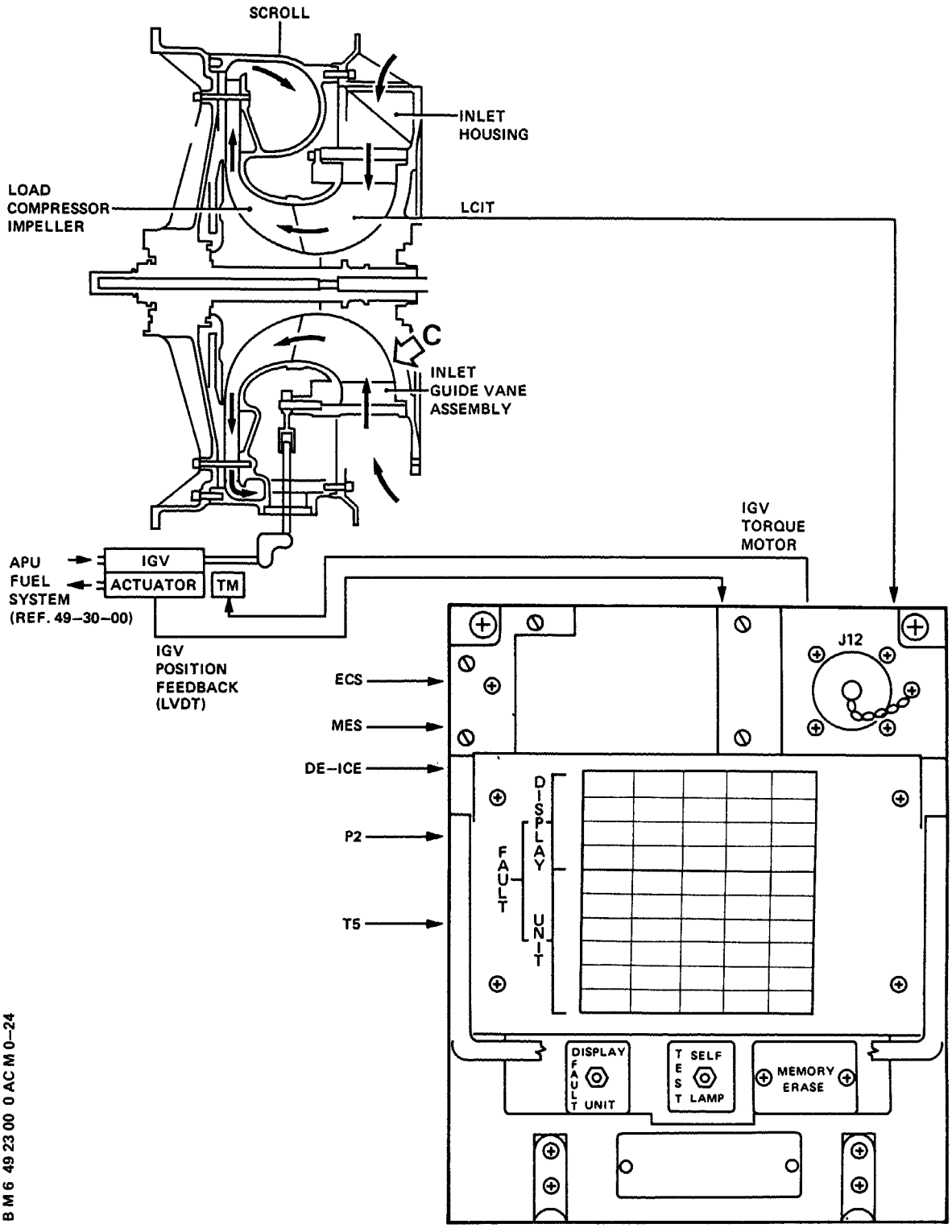
Load Compressor - Component Location
Figure 001

R

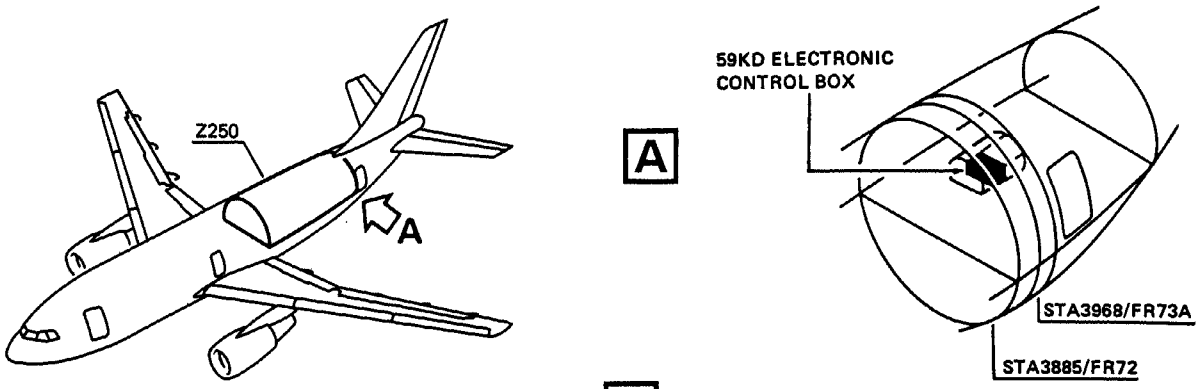
4. Operation

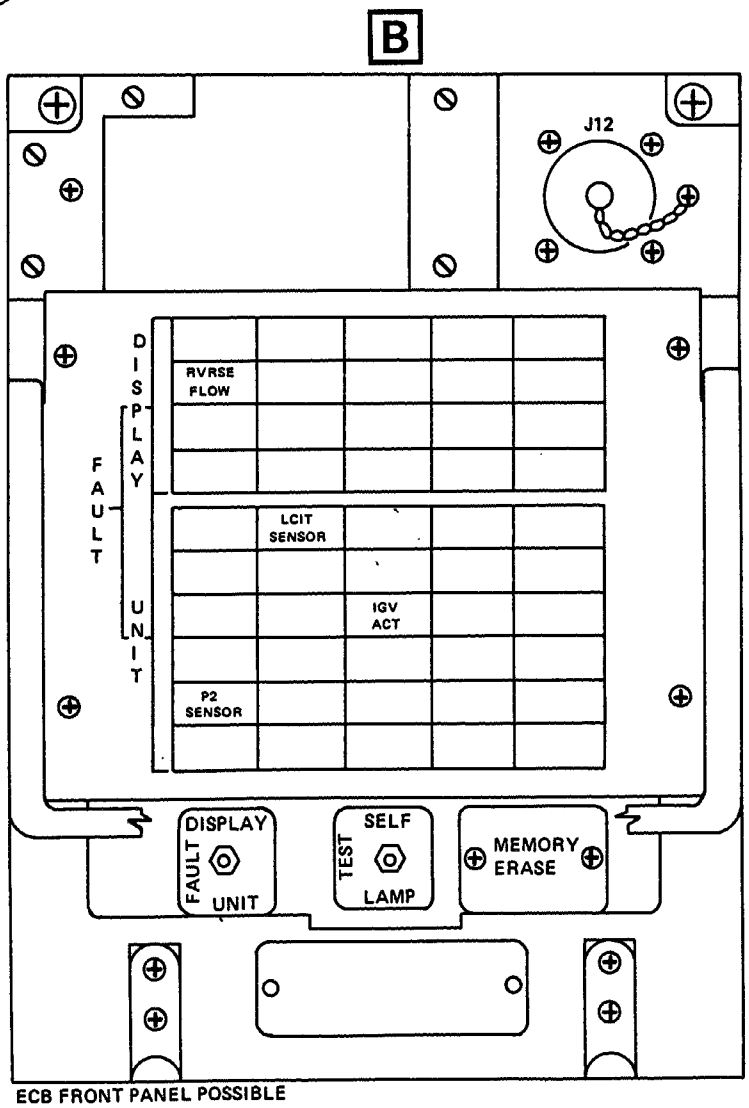
(Ref. Fig. 002)
(Ref. Fig. 003)

A. The load compressor output is regulated by the variable inlet guide vanes dependent on aircraft system demand (Ref. 49-51-00) as indicated by the demand signal to the ECB (Ref. 49-61-00).
During APU starting sequence, the servo input is zero current, which maintains the actuator at the fully extended position and the IGV's closed. This assures minimum airflow through the compressor and minimizes APU shaft loading during acceleration.
At 95 % rpm the IGV's assumes a position that corresponds to the required pneumatic demand.



IGV Control
Figure 002





ECB FRONT PANEL POSSIBLE
FAULT ILLUMINATION
FOR THE LOAD COMPRESSOR

B M 6 49 23 00 0 AE M 0–24

ECB - Fault Illumination
Figure 003

LOAD COMPRESSOR INLET TEMPERATURE (LCIT) SENSOR-REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Blanking Plug
D.	Torque Wrench, up to 60 lbf.in. (0.68 m.daN)
E.	Gasket

Referenced Procedures

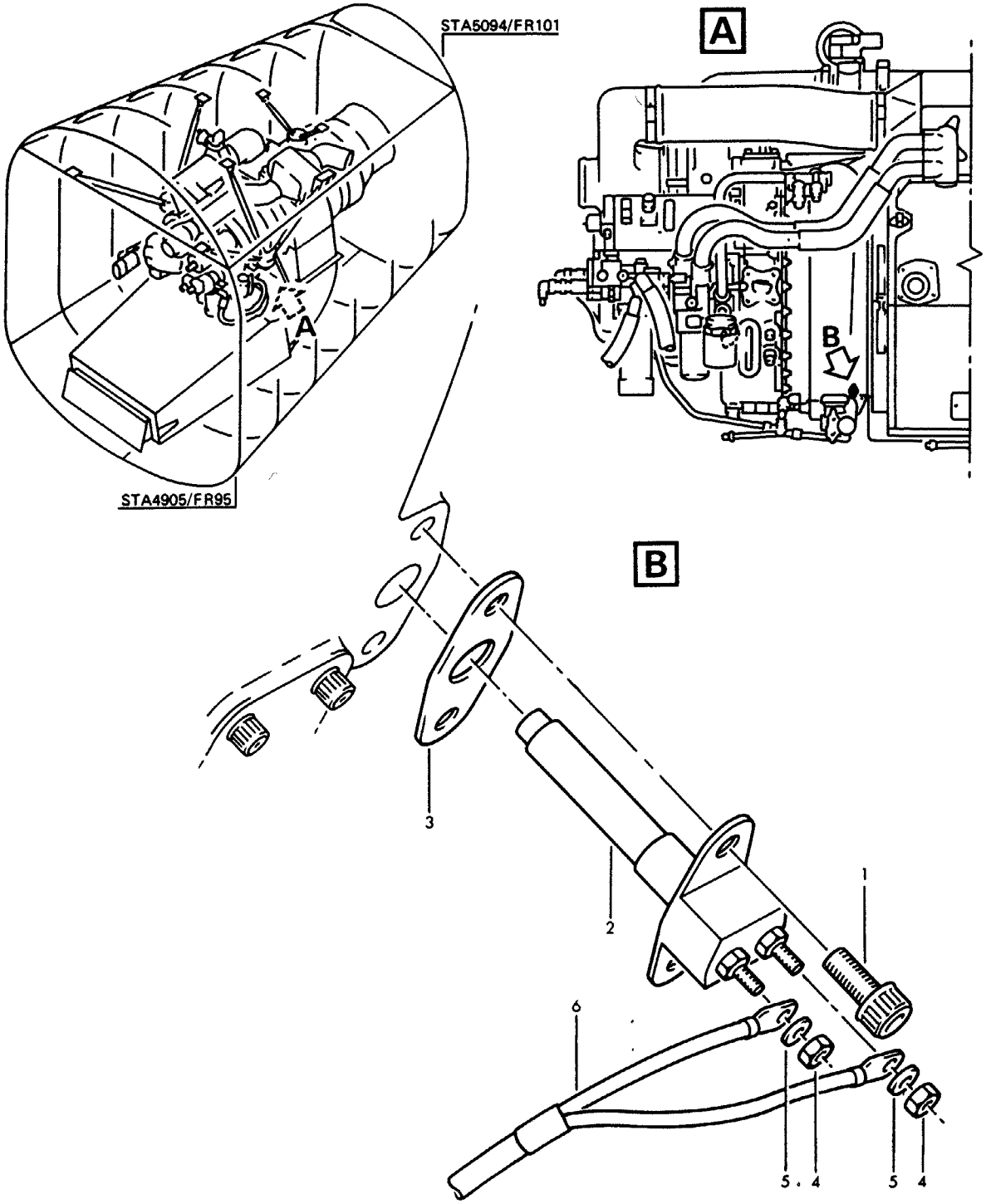
- 49-10-00, P. Block 501	Power Plant
- 49-73-00, P. Block 1	Analyzers

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access door 315AL.



LCIT Sensor
Figure 401

B. Removal
(1)Remove nuts (4), washers (5) and disconnect electrical connection (6).
(2)Remove bolts (1), LCIT sensor (2) and gasket (3). Discard gasket.
(3)Install blanking plug to LCIT sensor flange of compressor plenum shroud.

C. Installation
(1)Remove blanking plug from LCIT sensor flange.
(2)Install new gasket (3) on LCIT sensor (2).
(3)Position LCIT sensor (2) and install bolts (1).
(4)Torque bolts (1) to between 40 and 42 lbf.in. (0.45 and 0.48 m.daN).
CAUTION : MAKE CERTAIN THAT HARNESS ENDS ARE POSITIONED ON THEIR RESPECTIVE LCIT SENSOR STUDS. ALUMEL (AL) AND CHROMEL (CR) STUDS ARE DIFFERENT IN DIAMETER.
(5)Position harness ends (6) to their respective studs of the LCIT
R sensor (2).
R (6)Install washers (5) and nuts (4).
(7)Torque nut of alumel (AL) stud to 25 lbf.in. (0.28 m.daN) and nut of chromel (Cr) stud to 15 lbf.in. (0.17 m.daN).
(8)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

D. Test
(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(a)Operate APU for a sufficient time to check LCIT sensor for air leakage.
(2)Shut down APU (Ref. 49-10-00, P. Block 501).
(a)In case of auto-shutdown:
1 Take readings from Electronic Control Box (ECB), (Ref. 49-73-00, P. Block 1). For further action refer to TSM.

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 315AL and remove access platform.

INLET GUIDE VANE ACTUATOR - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

CAUTION : AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK.

CAUTION : MAKE CERTAIN THAT BUSHINGS (8) ROTATE FREELY ON PINS OF BLOCK ASSEMBLY (9).

CAUTION : MAKE CERTAIN THAT CHAMFER SIDE OF BLOCK ASSEMBLY (9) IS FACING AWAY FROM ENGINE TO AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Container, 2 l (0.5 US Gal.) Capacity
D.	Emery Cloth, Grade 600
E.	Circuit Breaker Safety Clips and Tags
F.	Torque Wrench, up to 150 lbf.in. (1.7 m.daN)
G.	O-Rings
H. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 30-11-00, P. Block 501	Wing Ice Protection
- 49-00-00, P. Block 501	Airborne Auxiliary Power
- 49-16-14, P. Block 401	Inlet Duct
- 49-23-14, P. Block 401	Inlet Guide Vane Actuator Linkage

2. Procedure

A. Job Set-Up

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(1)Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

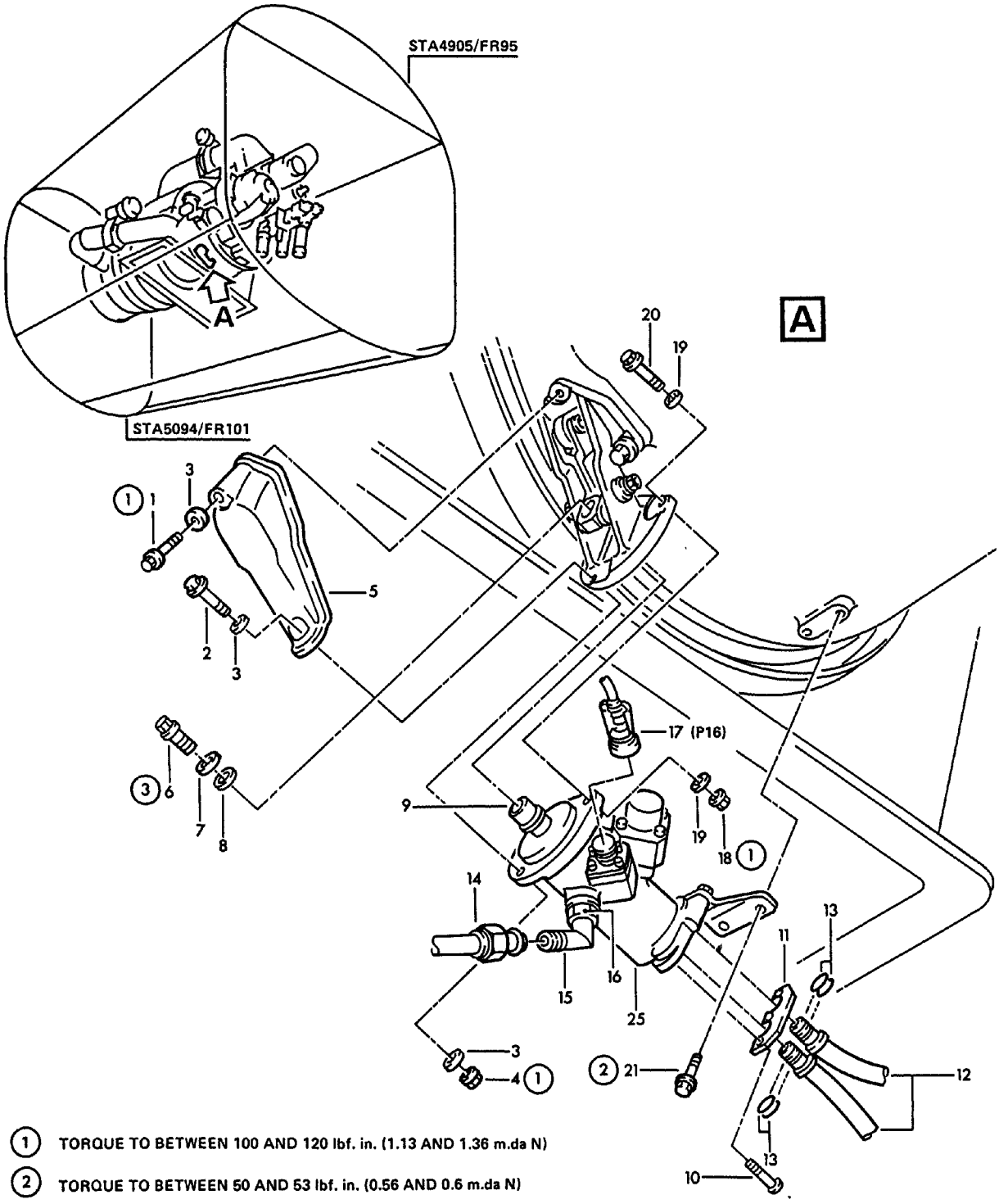
(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

(3)Position access platform and open access doors 315AL and 316AR.
(4)Remove inlet duct (Ref. 49-16-14, P. Block 401).

** BEFORE GARRETT SB GTCP331-49-5598

B. Removal
(Ref. Fig. 401)
(1)Disconnect electrical connector P16 (17).
(a)Install blanking cap and plug onto connector and receptacle.
(2)Remove nut (4), washers (3) and bolt (2).
(a)Remove bolt (1), washer (3) and cover (5).
(3)Remove bolt (6), shims (8) (up to 3) and washer (7).
(4)Position container below inlet guide vane actuator (IGVA) (25).
(5)Disconnect drain line (14).
(a)Install blanking cap and plug onto drain line (14) and drain fitting (15).
(6)Remove bolt (10) and support plate (11).
(a)Disconnect fuel lines (12).
(b)Discard O-rings (13).
(c)Install blanking caps and plugs onto fuel lines (12) and fuel ports of IGVA (25).
(7)Remove container.
(8)Support IGVA (25).
(a)Remove nuts (18), washers (19) and bolts (20).
(b)Remove bolts (21) and IGVA (25).



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(1) TORQUE TO BETWEEN 100 AND 120 lbf. in. (1.13 AND 1.36 m.da N)

(2) TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.56 AND 0.6 m.da N)

(3) TORQUE TO BETWEEN 120 AND 125 lbf. in. (1.36 AND 1.41 m.da N)

Inlet Guide Vane Actuator
Figure 401

** BEFORE GARRETT SB GTCP331-49-5598
** BEFORE GARRETT SB GTCP331-49-5454

C. Preparation for Installation
(Ref. Fig. 402)

(1)Check IGVA (25) for damage. Replace, if necessary.
(2)Check bushing (9) for damage. Replace, if necessary.
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(3)Clean inlet guide vane (IGV) bellcrank set using cleaning agent (MAT. NO. 11-002).
(a)Check bellcrank for damage. Replace, if necessary (Ref. 49-23-14, P. Block 401).
(b)Check IGV rod end for damage. Replace if necessary (Ref. 49-23-14, P. Block 401).
(4)For replacement of IGVA, carry out the following:
(a)On unserviceable IGVA:
1 Remove bushing (9).
2 Remove bolts (1) and bracket (2).
3 Release nut (16) and remove drain fitting (15). Discard O-ring (3).
(b)On new IGVA:
1 Install new O-ring (3), drain fitting (15) and nut (16). Do not tighten nut (16) at this stage.
2 Position bracket (2) and install bolts (1).
3 TORQUE bolts (1) to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(5)Calculate shims.
(a)Measure height of bellcrank trunnion, record as dimension (T).
(b)Measure height of trunnion bushing (9), record as dimension (B). Dimension (B) does not include thickness of flange.
(c)Dimension (S) is the thickness of shims (8) (maximum 3).
(d)Add 0.003 in. (0.075 mm) to dimension (T) and record as dimension (X).
(e)Subtract dimension (X) from dimension (B). The result is dimension (S).
(f)Required thickness of shims to obtain a build clearance of 0.002 to 0.004 in. (0.05 to 0.10 mm) is the calculated dimension (S) ± 0.001 in. (0.025 mm).
Example :

(1)	(2)
DIM. T	DIM. B
+0.003 in. (0.075 mm)	-DIM. X
DIM. X	DIM. S ± 0.001 in (0.025 mm)

(6)Install trunnion bushing (9) onto IGVA-shaft.

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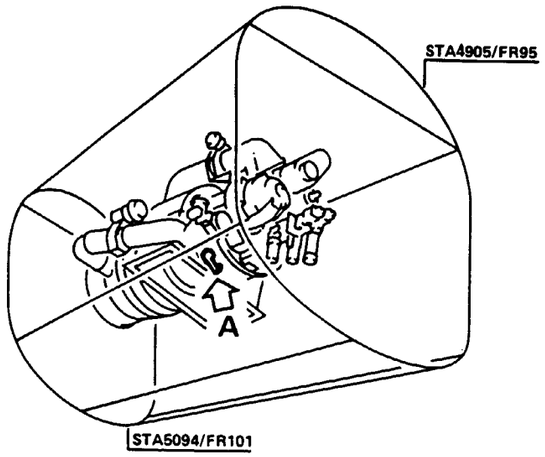

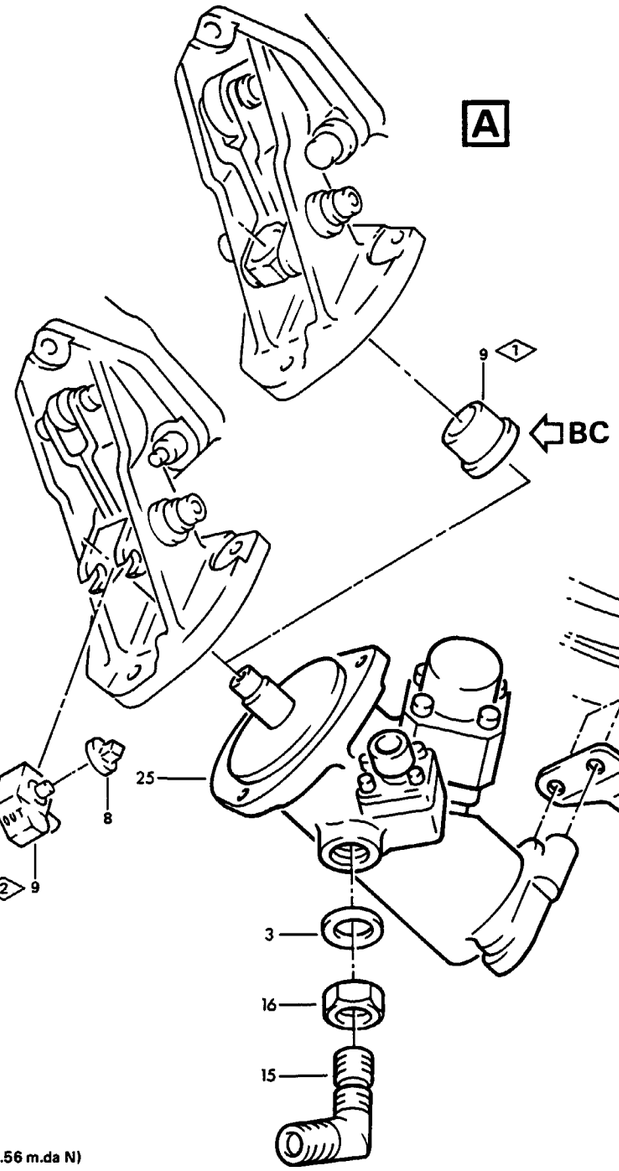

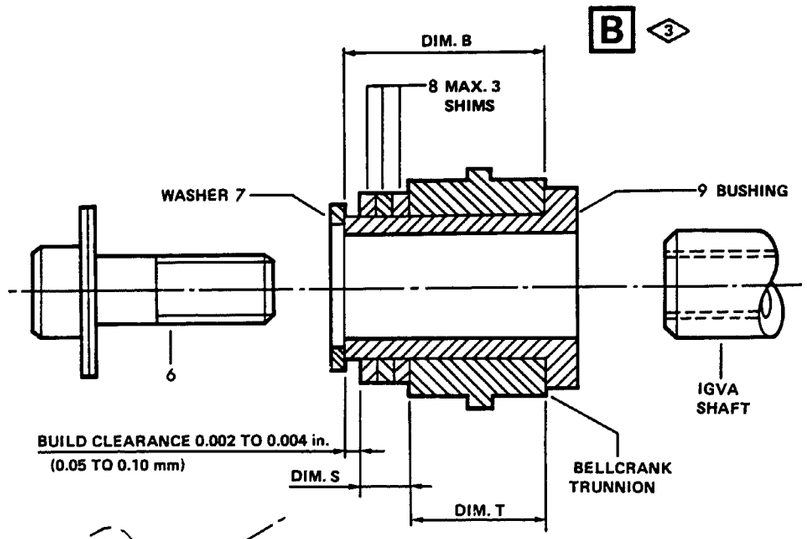

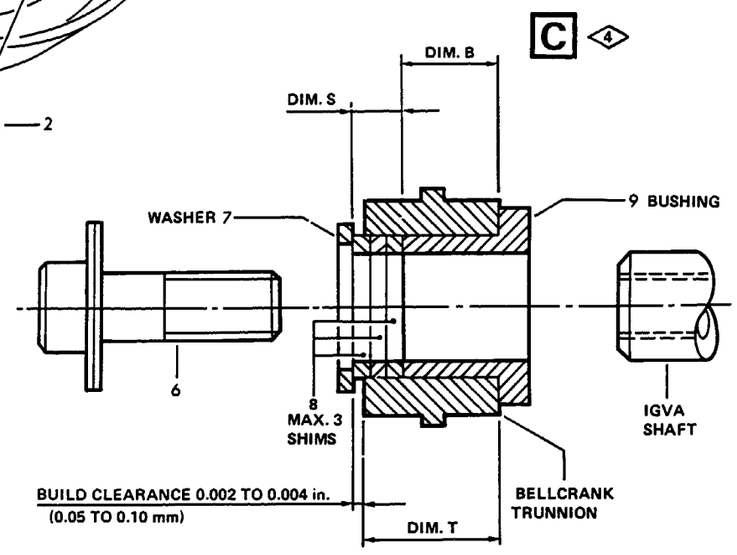

◇1◇ BEFORE GARRETT SB GTCP 331–5598

◇2◇ AFTER GARRETT SB GTCP 331–5598

◇3◇ BEFORE GARRETT SB GTCP 331–5598
BEFORE GARRETT SB GTCP 331–5454

◇4◇ BEFORE GARRETT SB GTCP 331–5598
AFTER GARRETT SB GTCP 331–5454

(1) TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.53 AND 0.56 m.da N)

(2) TORQUE TO BETWEEN 120 AND 125 Lbf. in. (1.36 AND 1.41 mdaN)

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Inlet Guide Vane Actuator
Preparation for Installation
Figure 402

** BEFORE GARRETT SB GTCP331-49-5598
** AFTER GARRETT SB GTCP331-49-5454

C. Preparation for Installation
(Ref. Fig. 402)
(1)Check IGVA for damage. Replace, if necessary.
(2)Check bushing (9) for damage. Replace, if necessary.
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(3)Clean Inlet Guide Vane (IGV) bellcrank set using cleaning agent (Mat. No. 11-002).
(a)Check bellcrank for damage. Replace, if necessary (Ref. 49-23-14, P. Block 401).
(b)Check IGV rod end for damage. Replace if necessary (Ref. 49-23-14, P. Block 401).
(4)For replacement of IGVA, carry out the following:
(a)On unserviceable IGVA:
1 Remove bushing (9).
2 Remove bolts (1) and bracket (2).
3 Release nut (16) and remove drain fitting (15). Discard O-ring (3).
(b)On new IGVA:
1 Install new O-ring (3), drain fitting (15) and nut (16). Do not tighten nut (16) at this stage.
2 Position bracket (2) and install bolts (1).
3 TORQUE bolts (1) to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(5)Calculate Shims:
(a)Measure height of bellcrank trunnion, record as dimension (T).
(b)Measure height of trunnion bushing (9), record as dimension (B). Dimension (B) does not include thickness of flange.
(c)Dimension (S) is the thickness of shims (maximum 3).
(d)Add 0.003 in. (0.075 mm) to dimension (T) and record as dimension (X).
(e)Subtract dimension (B) from dimension (X). The result is dimension (S).
(f)Required thickness of shims to obtain a build clearance of 0.002 to 0.004 in. (0.05 to 0.10 mm) is the calculated dimension (S) ± 0.001 in. (0.025 mm).

Example :

(1)	(2)
DIM. T	DIM. X
+0.003 in. (0.075 mm)	-DIM. B
DIM. X	DIM. S ± 0.001 in (0.025 mm)

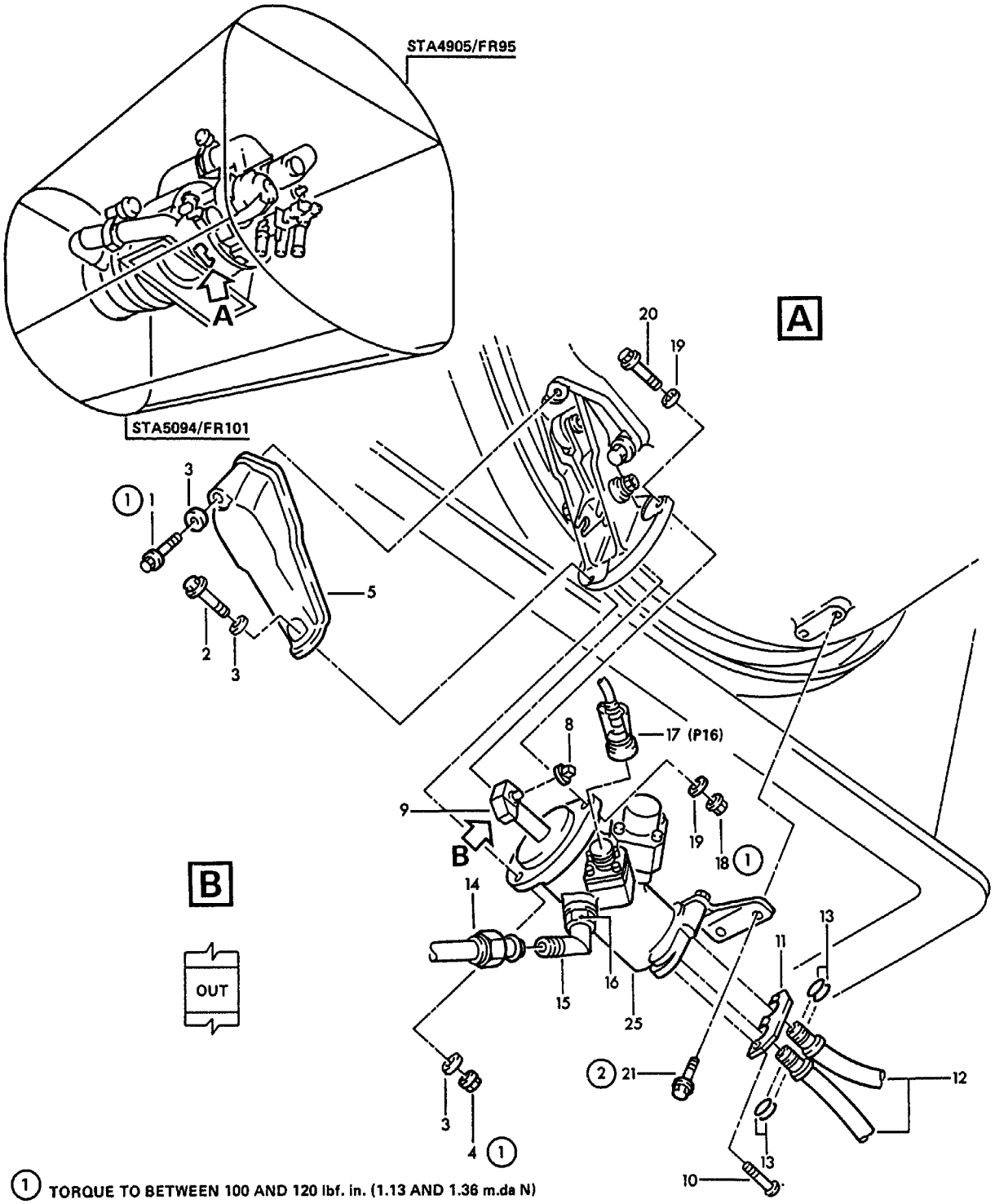
(6)Install trunnion bushing (9) onto IGVA-shaft.

** ON A/C ALL BEFORE GARRETT SB GTCP331-49-5598

D. Installation
(Ref. Fig. 401)
(1)Position IGVA (25) and install washers (19), bolts (20) and nuts (18).
(2)TORQUE nuts (18) to between 100 and 120 lbf.in. (1.13 and 1.36 m.daN).
(3)Make certain that inlet guide vanes are in fully closed position.
(4)Install calculated shims (8) (Ref. Para. C. (5)), washer (7) and bolt (6).
(5)Make certain that build clearance between shims (8) and IGV actuator mount trunnion is between 0.002 and 0.004 in. (0.05 and 0.10 mm). If necessary, adjust as follows:
(a)Remove bolt (6) and washer (7).
(b)Select shims (8) (maximum 3) according to the measured build clearance (Ref. Step (5)).
(c)Install washer (7) and bolt (6).
(d)TORQUE bolt (6) to between 120 and 125 lbf.in. (1.36 and 1.41 m.daN).
(e)Recheck build clearance between shims (8) and IGV actuator mount trunnion. Repeat adjustment, if necessary.
(6)Install bolts (21).
(7)TORQUE bolts (21) to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(8)Remove blanking caps and plugs from drain line (14) and drain fitting (15).
(a)Align drain fitting (15) with drain line (14) and tighten nut (16).
(b)Connect drain line (14).
(9)Remove blanking caps and plugs from fuel lines (12) and fuel ports of IGVA (25).
(a)Install new O-rings (13) and connect fuel lines (12).
(b)Install support plate (11) and bolts (10).
(10)Remove blanking caps and plugs from electrical connectors.
(a)Connect electrical connector P16 (17).
(11)Install inlet duct (Ref. 49-16-14, P. Block 401).

** AFTER GARRETT SB GTCP331-49-5598

B. Removal
(Ref. Fig. 403)
(1)Disconnect electrical connector P16 (17).
(a)Install blanking cap and plug onto connectors.
(2)Remove nut (4), washers (3) and bolt (2).
(a)Remove bolt (1), washer (3) and cover (5).
(3)Position container below inlet guide vane actuator (IGVA) (25).
(4)Disconnect drain line (14).
(a)Install blanking caps and plugs onto drain line (14) and drain fitting (15).
(5)Remove bolt (10) and support plate (11).
(a)Disconnect fuel lines (12).
(b)Discard O-rings (13).
(c)Install blanking caps and plugs onto fuel lines (12) and fuel ports of IGVA (25).
(6)Remove container.
CAUTION : AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK.
(7)Support IGVA (25).
(a)Remove bolt (20) and washers (19) and nut (18).
(b)Remove bolts (21) and IGVA (25).



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(1) TORQUE TO BETWEEN 100 AND 120 lbf. in. (1.13 AND 1.36 m.da N)

(2) TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.56 AND 0.6 m.da N)

Inlet Guide Vane Actuator
Figure 403

C. Preparation for Installation
(Ref. Fig. 402)
(1)Check IGVA for damage. Replace, if necessary.
(2)Check bushing (8) and block assembly (9) for damage.
Replace, if necessary.
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(3)Clean bellcrank set using cleaning agent (Mat. No. 11-002).
(a)Check bellcrank for damage. Replace, if necessary (Ref. 49-23-14, P. Block 401).
(b)Check rod end for damage. Replace if necessary (Ref. 49-23-14, P. Block 401).
(4)For replacement of IGVA, carry out the following:
(a)On unserviceable IGVA:
1 Remove bolts (1) and bracket (2).
2 Release nut (16) and remove drain fitting (15). Discard O-ring (3).
3 Remove block assembly (9) and bushings (8) from IGVA-shaft.
(b)On new IGVA:
1 Install new O-ring (3), drain fitting (15) and nut (16). Do not tighten nut (16) at this stage.
2 Position bracket (2) and install bolts (1).
- TORQUE bolts (1) to between 50 and 53 lbf.in. (0.56 and 0.60 m.daN).
3 Install block assembly (9) onto IGVA-shaft.
4 TORQUE block assembly (9) to between 120 and 125 lbf.in. (1.36 and 1.41 m.daN).
CAUTION : MAKE CERTAIN THAT BUSHINGS (8) ROTATE FREELY ON PINS OF BLOCK ASSEMBLY (9).
5 Install bushings (8) onto block assembly (9).
NOTE : Increase inner diameter of bushings (8), using emery cloth if rotation is not sufficient.

D. Installation
(Ref. Fig. 403)
CAUTION : MAKE CERTAIN THAT CHAMFER SIDE OF BLOCK ASSEMBLY (9) IS FACING AWAY FROM ENGINE TO AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK.
(1)Connect the block assembly (9) onto bellcrank and position IGVA (25).
(2)Install washers (19), bolts (20) and nuts (18).
(a)TORQUE nut (18), to between 100 to 120 lbf.in. (1.13 to 1.36 m.daN).
(3)Install bolts (21).
(a)TORQUE bolts (21) to between 50 to 53 lbf.in (0.56 to 0.60 m.daN).
(4)Remove blanking caps and plugs of drain line (14) and drain fitting (15).
(a)Align drain fitting (15) with drain line (14) and tighten nut (16).
(5)Connect drain line (14).
(6)Remove blanking caps and plugs of fuel lines (12) and fuel ports of IGVA (25).
(a)Fit new O-rings (13) and connect fuel lines (12).
(b)Install support plate (11) and bolts (10).
(7)Remove blanking cap and plug of connector.
(a)Connect electrical connector P16 (17).
(8)Install inlet duct (Ref. 49-16-14, P. Block 401).

** ON A/C ALL

E. Test
(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD, 1QF and 71KD.
(2)Start and operate APU (Ref. 49-00-00, P. Block 501).
(a)Make certain, that fuel and drain lines do not leak.
(b)Apply pneumatic load (Ref. 49-00-00, P. Block 501).
1 Accomplish wing de-icing (Ref. 30-11-00, P. Block 501).
2 Check that IGVA is in fully retracted position.
(c)Shut down APU (Ref. 49-00-00, P. Block 501).
(3)Position cover(5) and install bolts (1, 2), washer (3) and nut (4).
(a)TORQUE nut (4) and bolt (1) to between 100 and 120 lbf.in. (1.13 and 1.36 m.daN).
(4)Start and operate APU (Ref. 49-00-00, P. Block 501).
(a)Make certain that the bellcrank assembly has full freedom of movement.
(b)Shut down APU (Ref. 49-00-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

INLET GUIDE VANE ACTUATING LINKAGE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Container, 2 l (0.5 US Gal.) Capacity
D.	Emery Cloth (Grade 600)
E.	Circuit Breaker Safety Clips and Tags
R F.	Push/Pull Gauge DDP-75
G.	Torque Wrench, 0-1.7 m.daN (0-150 lbf.in.)
H.	O-Rings
J.	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.024 in.) dia.
K.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
L. Material No. 08-056	Bonding and Adhesive Compounds (Ref. 20-31-00)
M. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 49-00-00, P. Block 501	Airborne Auxiliary Power
- 49-23-13, P. Block 401	Inlet Guide Vane Actuator
- 49-16-14, P. Block 401	Inlet Duct
- 51-76-10, P. Block 801	Repair of Sealing

2. Procedure

(Ref. Fig. 401)

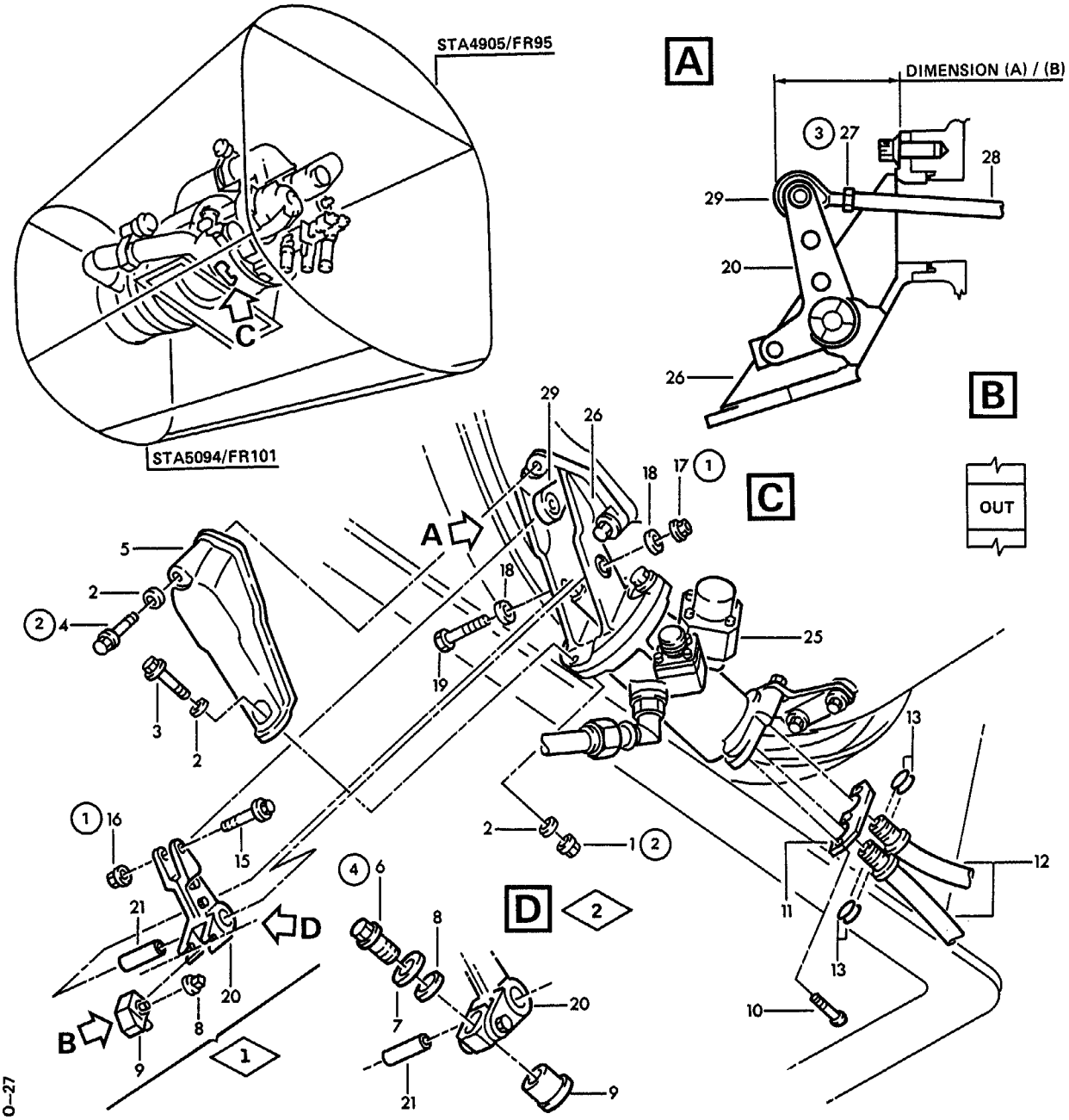
A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK/CTL	71KD	B53

(2)Position access platform and open access doors 315AL and 316AR.

(3)Remove inlet duct (Ref. 49-16-14, P. Block 401).


STA4905/FR95
STA5094/FR101
A
DIMENSION (A) / (B)
B
C
D
OUT
BM6 49 23 14 4 AAMO-27
1 TORQUE TO BETWEEN 40 AND 42 lbf. in. (0.45 AND 0.47 m.da N)
2 TORQUE TO BETWEEN 100 AND 120 lbf. in. (1.13 AND 1.36 m.da N)
3 TORQUE TO BETWEEN 35 AND 37 lbf. in. (0.40 AND 0.42 m.da N)
4 TORQUE TO BETWEEN 120 AND 125 lbf. in. (1.36 AND 1.41 m.da N)
1 AFTER GARRETT SB 49-5598
2 BEFORE GARRETT SB 49-5598

Inlet Guide Vane Actuating Linkage
Figure 401

B. Removal/Installation of Bellcrank

** BEFORE GARRETT SB GTCP331-49-5598

(1)Removal
(a)Position container below Inlet Guide Vane Actuator (IGVA) (25).
(b)Remove bolts (10) and support plate (11).
1 Disconnect fuel lines (12).
2 Remove and discard O-rings (13).
3 Install blanking caps and plugs on to fuel lines (12) and fuel ports of IGVA (25).
(c)Remove container.
(d)Remove nut (1), washers (2) and bolt (3).
1 Remove bolt (4), washer (2) and cover (5).
(e)Remove bolt (6), washer (7) and shims (8) (maximum 3).
(f)Pull rod end (29) fully outward.
1 Cut and remove lockwire from nut (16).
2 Remove nut (16) and bolt (15).
(g)Remove nut (17), washers (18) and bolt (19).
1 Remove bellcrank (20) and shaft (21).
(2)Preparation for Installation
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(a)Clean Inlet Guide Vane (IGV) linkage using cleaning agent (MAT. NO. 11-002).
(b)Check bellcrank (20) for damage. Replace if necessary.
1 Check shaft (21) for damage. Replace if necessary.
2 Check rod end (29) for damage. Replace if necessary (Ref. para. D.).
(c)Carry out IGV-linkage pull-test (Ref. para. C.).

(3)Installation
(a)Install shaft (21) onto bellcrank (20).
1 Position bellcrank (20) and install bolt (19), washers (18) and nut (17).
2 TORQUE nut (17) to between 0.45 and 0.47 m.daN (40 and 42 lbf.in.).
(b)Align bellcrank (20) with rod end (29).
1 Install bolt (15) and nut (16).
2 TORQUE nut (16) to between 0.45 and 0.47 m.daN (40 and 42 lbf.in.).
3 Safety nut (16) using lockwire 0.8 mm (0.032 in.) dia.
(c)Calculate thickness of shims (8) (Ref. 49-23-13, P. Block 401).
(d)Install calculated shims (maximum 3), washer (7) and bolt (6).
1 Make certain, that build clearance between shims (8) and IGVA mount trunnion is between 0.05 and 0.10 mm (0.002 and 0.004 in.). If necessary, adjust as follows:
2 Remove bolt (6) and washer (7).
3 Select shims (8) (maximum 3) according to the measured build clearance.
4 Install washer (7) and bolt (6).
5 TORQUE bolt (6) to between 1.36 and 1.41 m.daN (120 and 125 lbf.in.).
6 Recheck build clearance between shims (8) and IGVA mount trunnion. Repeat adjustment if necessary.
(e)Position cover (5) and install washers (2), bolts (3, 4) and nut (1).
1 TORQUE nut (1) and bolt (4) to between 1.13 and 1.36 m.daN (100 and 120 lbf.in.).
(f)Remove blanking caps and plugs from fuel lines (12) and fuel ports of IGVA (25).
1 Install new O-rings (13) and connect fuel lines (12).
2 Install support plate (11) and bolts (10).

** AFTER GARRETT SB GTCP331-49-5598

(1)Removal
(a)Position container below Inlet Guide Vane Actuator (IGVA) (25).
(b)Remove bolts (10) and support plate (11).
1 Disconnect fuel lines (12).
2 Remove and discard O-rings (13).
3 Install blanking caps and plugs on to fuel lines (12) and fuel ports of IGVA (25).
(c)Remove container.
(d)Remove nut (1), washers (2) and bolt (3).
1 Remove bolt (4), washer (2) and cover (5).
(e)Pull rod end (29) fully outward.
1 Cut and remove lockwire from nut (16).
2 Remove nut (16) and bolt (15).
(f)Remove nut (17), washers (18) and bolt (19).
CAUTION : AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK (20).
(g)Remove bellcrank (20) and shaft (21).
1 Remove and retain bushings (8).
(2)Preparation for Installation
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(a)Clean Inlet Guide Vane (IGV) linkage, using cleaning agent (MAT. NO. 11-002).
(b)Check bellcrank (20) for damage. Replace if necessary.
(c)Check shaft (21) for damage. Replace if necessary.
(d)Check rod end (29) for damage. Replace if necessary (Ref. para. D.).
(e)Check bushings (8) for damage. Replace if necessary.
(f)Carry out IGV-linkage pull-test (Ref. para. C.).

(3)Installation

CAUTION : MAKE CERTAIN THAT CHAMFER SIDE OF BLOCK ASSEMBLY (9) IS FACING AWAY FROM ENGINE. AVOID DAMAGE OF BUSHINGS (8) AND BELLCRANK (20). DURING INSTALLATION MAKE CERTAIN THAT BUSHINGS (8) ROTATE FREELY ON PINS OF BLOCK ASSEMBLY (9).

(a)Install bushings (8) onto block assembly (9).

1 Make certain that bushings (8) rotate freely on pins of block assembly (9).

NOTE : If rotation is not sufficient, increase inner diameter of bushings (8), using emery cloth.

2 Install shaft (21) onto bellcrank (20).

3 Position bellcrank (20) and install bolt (19), washers (18) and nut (17).

4 TORQUE nut (17) to between 0.45 and 0.47 m.daN (40 and 42 lbf.in.).

(b)Align bellcrank (20) with rod end (29).

1 Install bolt (15) and nut (16).

2 TORQUE nut (16) to between 0.45 and 0.47 m.daN (40 and 42 lbf.in.).

3 Safety nut (16), using lockwire 0.8 mm (0.032 in.) dia.

(c)Position cover (5) and install washers (2), bolts (3, 4) and nut (1).

1 TORQUE nut (1) and bolt (4) to between 1.13 and 1.36 m.daN (100 and 120 lbf.in.).

(d)Remove blanking caps and plugs from fuel lines (12) and fuel ports of IGVA (25).

1 Install new O-rings (13) and connect fuel lines (12).

2 Install support plate (11) and bolts (10).

** On All A/C

C. Pull-test of Inlet Guide Vane (IGV) Linkage
(1)Removal
(a)Remove nut (1), washers (2) and bolt (3).
1 Remove bolt (4), washer (2) and cover (5).
(b)Position container below Inlet Guide Vane Actuator (IGVA) (25).
(c)Remove bolts (10) and support plate (11).
1 Disconnect fuel lines (12).
2 Discard O-rings (13).
3 Pull rod end (29) fully outward.
4 Install new O-rings (13) and connect fuel lines (12).
5 Install support plate (11) and bolts (10).
(d)Remove container.
(e)Cut and remove lockwire from nut (16).
1 Remove nut (16) and bolt (15).
(2)Pull-test
(a)Push IGV control rod (28) to fully inward position.
(b)Connect push/pull gauge to the rod end (29).
CAUTION : MAKE CERTAIN, THAT THE PUSH/PULL GAUGE IS PULLED IN LINE WITH IGV CONTROL ROD.
(c)Pull gauge outward and record IGV-opening force.
R NOTE : IGVs will travel approx. 1.00 in. with 50 lbf. (25. mm with 222 N).
(3)Preparation for Installation
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(a)Clean IGV linkage using cleaning agent (MAT. NO. 11-002).
(b)Check bellcrank (20) for damage. Replace if necessary (Ref. para. (B)).
1 Check rod end (29) for damage. Replace if necessary (Ref. para. (D)).
(4)Installation
(a)Align bellcrank (20) with rod end (29).
1 Install bolt (15) and nut (16).
2 TORQUE nut (16) to between 0.45 and 0.47 m.daN (40 and 42 lbf.in.).
3 Safety nut (16), using lockwire 0.8 mm (0.032 in.) dia.
(b)Position cover (5) and install washers (2), bolts (3, 4) and nut (1).
1 TORQUE nut (1) and bolt (4) to between 1.13 and 1.36 m.daN (100 and 120 lbf.in.).

D. Removal/Installation of Rod End

(1)Removal
(a)Remove Inlet Guide Vane Actuator (IGVA) (Ref. 49-23-13, P. Block 401).
(b)Carry out measurement of rod end length.
1 Pull rod end (29) to fully outward extension.
2 Measure from IGVA mount (26) to the outward top of rod end bearing (29).
3 Record rod end length as dimension (A).
(c)Cut and remove lockwire from nut (16).
1 Remove nut (16) and bolt (15).
CAUTION : MAKE CERTAIN, THAT THERE IS NO RELATIVE MOVEMENT BETWEEN IGV-CONTROL ROD (28) AND IGV MASTER GEAR ROD END.
(d)Cut and remove lockwire from jam nut (27).
1 Loosen jam nut (27) and remove rod end (29) from Inlet Guide Vane control rod (IGV-control rod) (28).
NOTE : Record number of rotations, necessary for removal of the rod end (29).
(2)Preparation for Installation
(a)Remove and retain jam nut (27).
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(b)Clean Inlet Guide Vane (IGV) linkage, using cleaning agent (MAT. NO. 11-002).
1 Remove residual sealant (Ref. 51-76-10, P. Block 801)
(c)Check bellcrank (20) for damage. Replace if necessary (Ref. para. (B)).
1 Check rod end (29) for damage. Replace if necessary.
2 Check jam nut (27) for damage. Replace if necessary.
(d)Position jam nut (27) onto replacement rod end (29).

(3)Installation

CAUTION : MAKE CERTAIN, THAT THERE IS NO RELATIVE MOVEMENT BETWEEN IGV-CONTROL ROD (28) AND IGV MASTER GEAR ROD END.

(a)Install rod end (29) onto control rod (28).

NOTE : Make certain, that number of rotations during installation is equal to the number, recorded during removal.

(b)Connect rod end (29) and bellcrank (20) with bolt (15).

(c)Carry out measurement of rod end length.

1 Pull rod end (29) to fully outward extension.

2 Measure from IGVA mount (26) to the outward top of rod end bearing (29).

3 Record rod end length as dimension (B).

(d)If the dimension (B) is equal to recorded dimension (A), carry on with step (f).

(e)If the dimension (B) is not equal to recorded dimension (A), adjust as follows:

1 Disconnect bolt (15) from bellcrank (20).

2 Turn the rod end in either direction to obtain the correct length of dimension (B).

3 Connect rod end (29) to bellcrank (20) with bolt (15) and repeat measurement of rod end length (Ref. step (c)).

(f)Install nut (16).

1 TORQUE nut (16) to between 0.45 and 047 m.daN (40 and 42 lbf.in.).

2 Safety nut (16), using lockwire 0.8 mm (0.032 in.) dia.

CAUTION : MAKE CERTAIN, THAT THERE IS NO RELATIVE MOVEMENT BETWEEN IGV CONTROL ROD AND IGV MASTER GEAR ROD END.

(g)TORQUE jam nut (27) to between 0.40 and 0.42 m.daN (35 and 37 lbf.in.).

(h)Safety jam nut (27), using lockwire 0.6 mm (0.020 in.) dia.

1 Apply a bead of sealant (MAT. NO. 8-056) 12.7 mm (0.5 in.) wide and 6.35 mm (0.25 in.) deep over lockwire where it crosses over the jam nut (Ref. 51-76-10, P. Block 801).

(i)Install IGVA (Ref. 49-23-13, P. Block 401).

(k)Install Inlet Duct (Ref. 49-16-14, P. Block 401).

(l)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

E. Test

(1)Start and operate APU (Ref. 49-00-00, P. Block 501).
(a)Make certain, that fuel and drainlines do not leak.
(b)Apply pneumatic load (Ref. 49-00-00, P. Block 501).
1 Accomplish wing de-icing (Ref. 30-11-00, P. Block 501).
(2)Shut down APU (Ref. 49-00-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

ACCESSORY DRIVE GEARBOX - DESCRIPTION AND OPERATION

1. General

The gear drives installed in the gearbox reduce the turbine speed to drive the accessory units.
The gearbox pressurization system regulates the seal buffering air flow and provides and maintains the gearbox pressure for APU operation above 15,000 ft.

2. Component Location

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	SHUTOFF VALVE-GEARBOX PRESSURE				49-26-13
	VALVE-GEARBOX SHUTTLE				49-26-14
	REGULATOR VALVE-GEARBOX PRESSURE				49-26-15

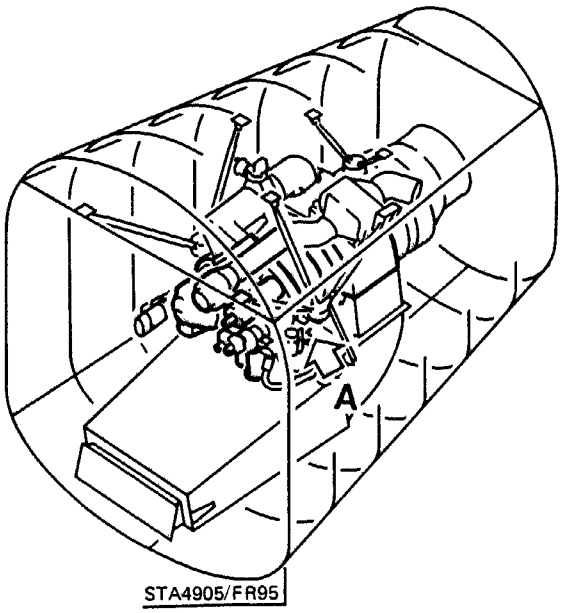
3. Description

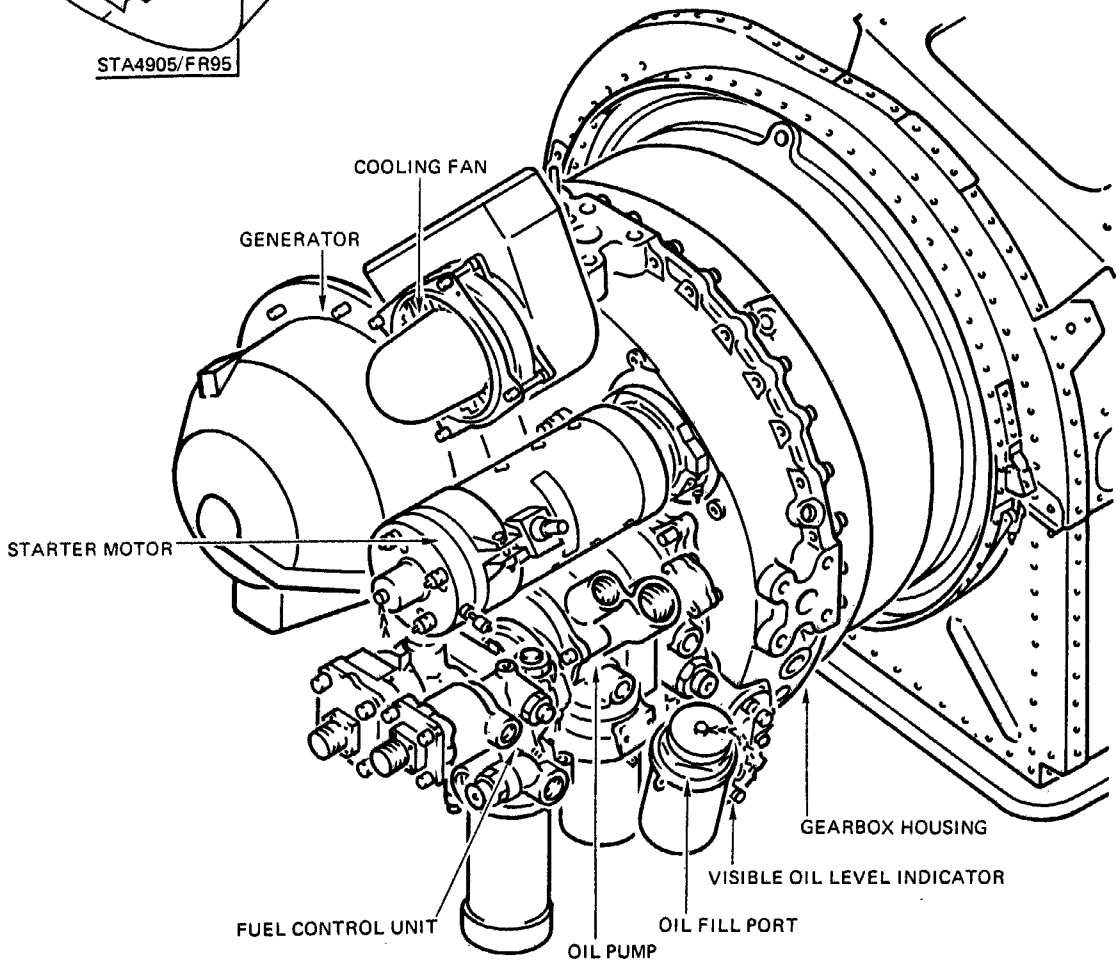
(Ref. Fig. 001, 002)

A. The gearbox is attached to the load compressor thru a flanged joint and is driven directly from the turbine.
The gearbox incorporates flanges for mounting the following accessory units:
- Starter Motor
- Oil Pump Assembly with Fuel Control Unit
- Cooling Fan
- Generator

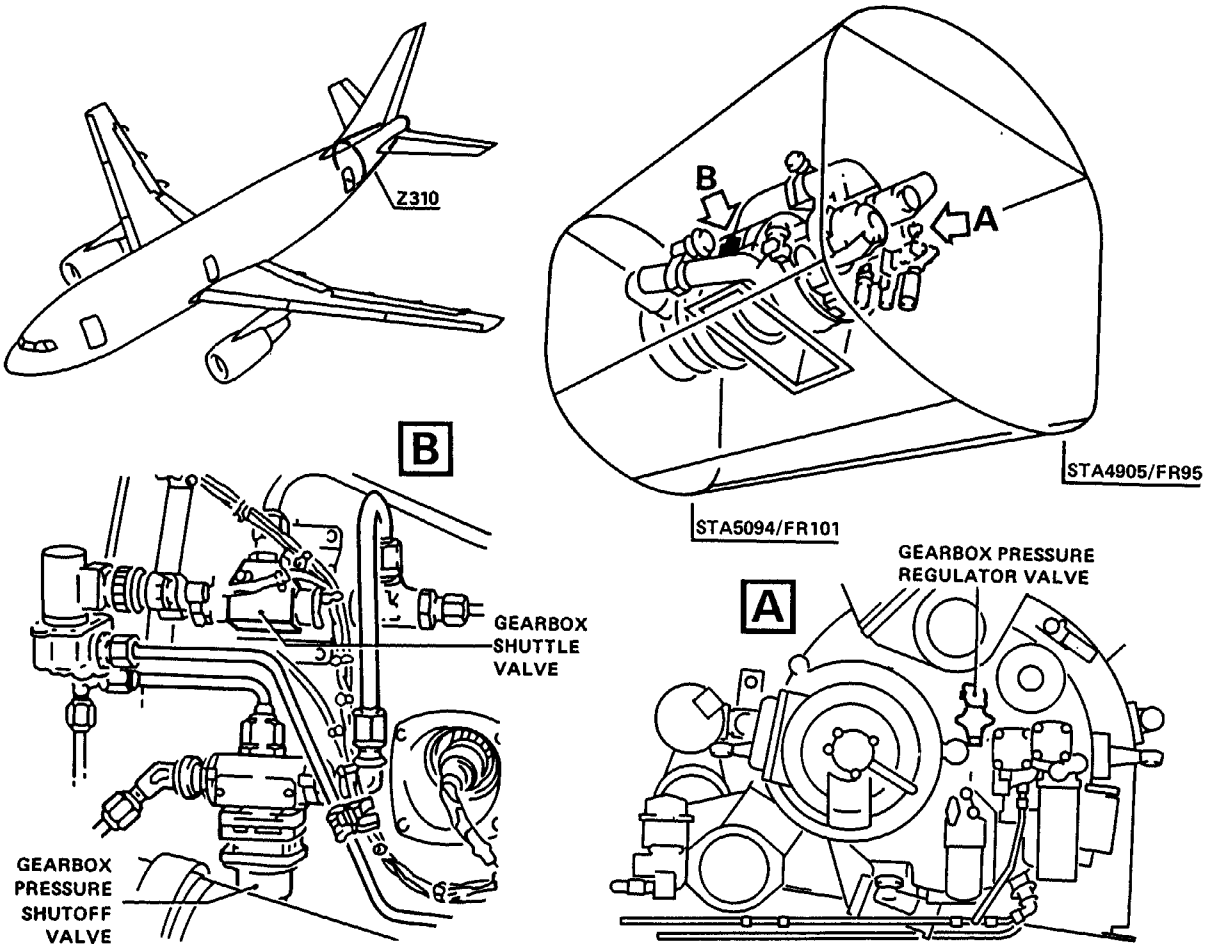
The gearbox housing contains an oil reservoir for the APU oil system.

B. The gearbox pressurization system provides and maintains gearbox pressure for APU operation and regulates the buffered air sealing system. It consists of a gearbox pressure regulator valve, gearbox pressure shutoff valve and gearbox shuttle valve.
The buffered air sealing system avoids oil passing the primary seals into the load compressor. It is controlled by the gearbox shuttle valve, PCD1 and PCD2 air pressure.

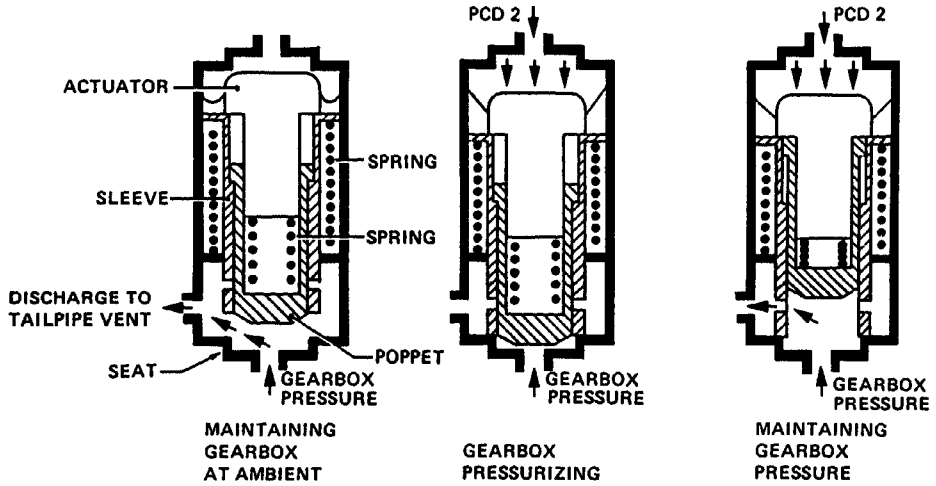




Acessory Drive Grarbox
Figure 001



GEARBOX PRESSURE REGULATOR VALVE OPERATION



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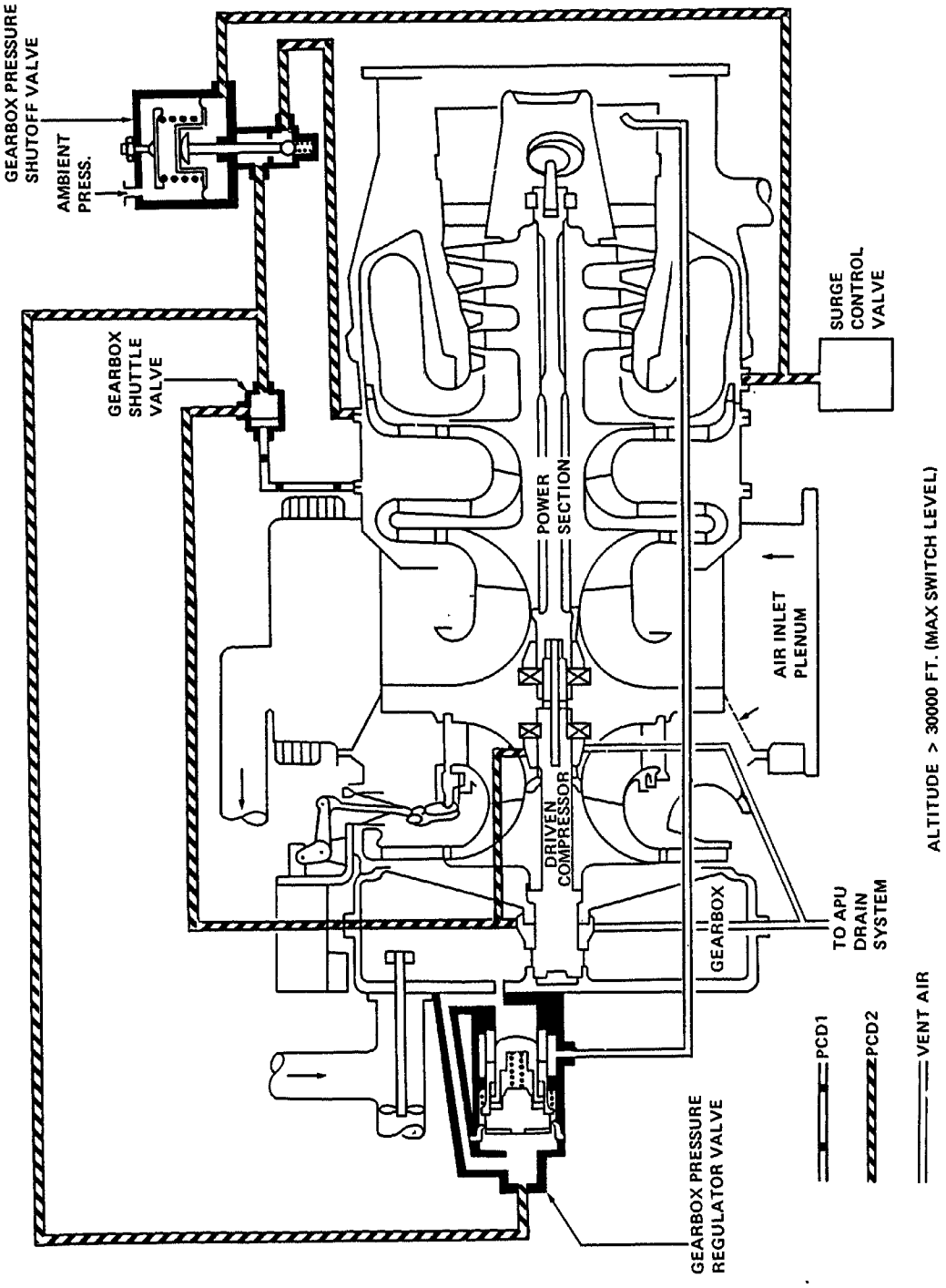
Gearbox Pressure System
Figure 002

4. Operation
(Ref. Fig. 003)

A. When air pressure of the power compressor discharge 2 (PCD2) decreases below 52 ±3 psig, the gearbox pressure shutoff valve opens. This will occur anywhere between 15,000 and 30,000 ft. PCD2 air pressure flows to the gearbox pressure regulator valve, which controls the gearbox pressure to 4.5 psig above ambient. Excess gearbox pressure will be vented thru the APU exhaust, by the air/oil separator and the pressure regulator valve.

R B. When APU operates with PCD2 below 52 ± 3 psig, PCD2 air pressure from
R the shut-off valve overrides the shuttle valve to buffer the two
R labyrinth seals. Air flowing past the seal is vented to the APU drain
R system.

R C. When APU operates with PCD2 above 52 ± 3 psig, PCD1 air pressure flows
R thru the gearbox shuttle valve to buffer the two labyrinth seals.
R Air flowing past the seal is vented to the APU drain system.



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Gearbox Pressurization - Schematic
Figure 003

GEARBOX PRESSURE SHUTOFF VALVE
REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT.NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Covers
D. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
F.	O-Rings
G.	Retainers

Referenced Procedures

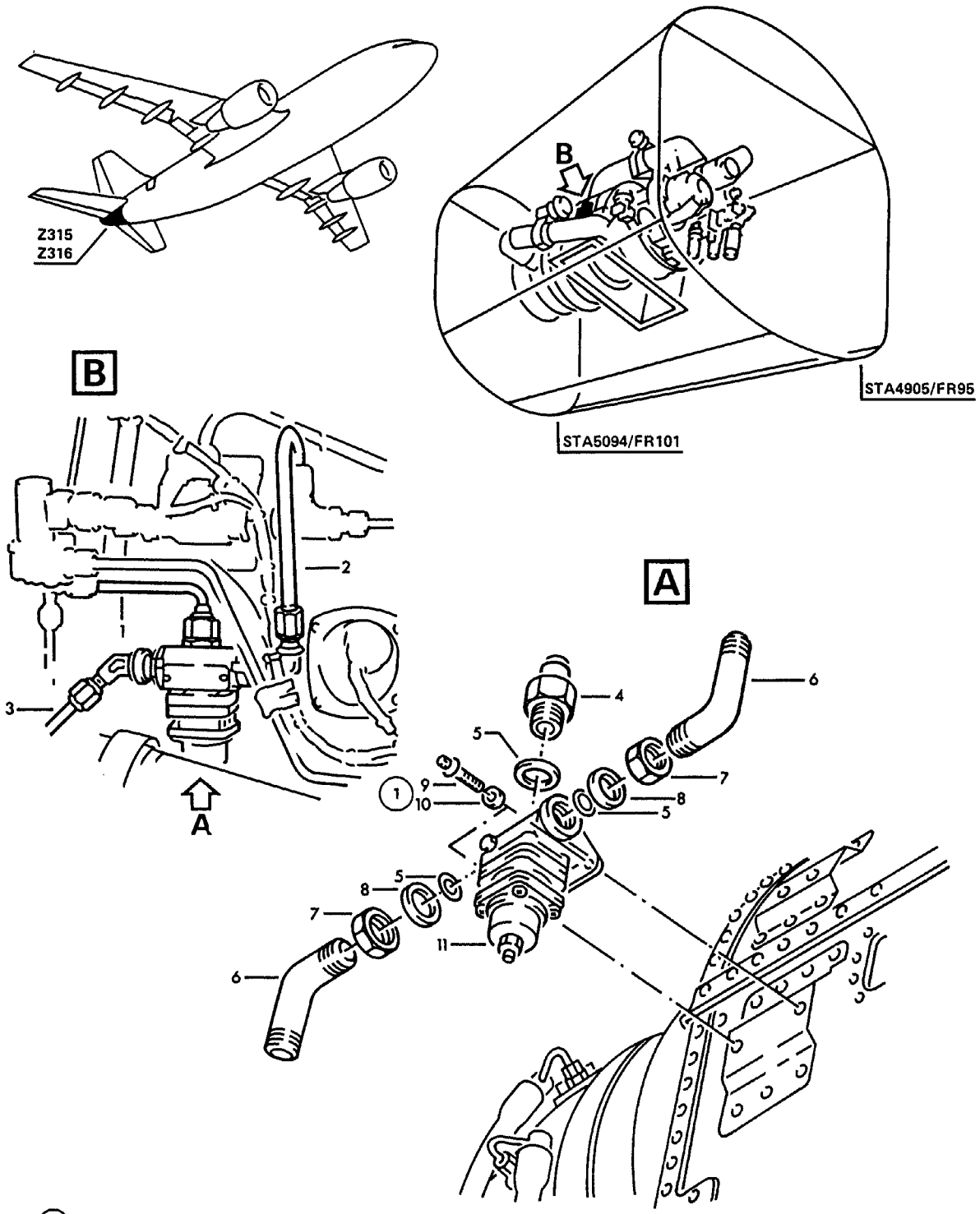
- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



(1) TORQUE TO BETWEEN 50 AND 55 lbf.in. (0.56 AND 0.62m.daN)

Gearbox Pressure Shutoff Valve
Figure 401

B. Removal

NOTE : Fit protective covers to all disconnected lines and open orifices.

(1)Disconnect pneumatic lines (1, 2, 3).

(2)Remove bolts (9), washers (10), and gearbox pressure shutoff valve (11).

C. Preparation for Installation

WARNING : CLEANING AGENT MAT. NO 11-002 IS DANGEROUS.

(1)Clean gearbox pressure shutoff valve using cleaning agent (Mat. No. 11-002) and dry compressed air.

(2)Check gearbox pressure shutoff valve (11) for damage and cracks.

(a)Replace if neccessary.

(3)On old gearbox pressure shutoff valve (11), loosen nuts (7) and remove elbows (6) and union (4).

(4)Remove and discard O-rings (5).

(5)Install new O-rings (5) on replacement valve.

NOTE : If necessary, replace retainers (8).

(6)Install elbows (6) and union (4) on replacement valve.

(a)Do not tighten nuts (7) at this stage.

D. Installation

NOTE : Remove protective covers from all disconnected lines and orifices.

(1)Position gearbox pressure shutoff valve (11), install bolts (9) with washers (10).

(a)TORQUE bolts (9) to between 50 and 55 lbf.in. (0.56 and 0.62 m.daN).

(2)Connect pneumatic lines (1, 2, 3).

(3)Tighten nuts (7) of elbows (6).

E. Test

(1)Check oil level in gearbox sump.

(a)Replenish if necessary (Ref. 12-13-49, P. Block 1).

(2)Start and operate APU (Ref. 49-10-00, P. Block 501).

(3)Check gearbox pressure shutoff valve connection and pneumatic line connections for leakage.

(4)Leakage is not permissible.

(5)Shut down APU.

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.

(2)Remove safety clips and tags, and close circuit breakers 50KA, 1KD and 71KD.

(3)Close access doors 315AL and 316AR and remove access platform.

GEARBOX SHUTTLE VALVE
REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002 THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Saftey Clips and Tags
C.	Blanking Caps and Plugs
D. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
F.	O-Rings
G.	Retainers

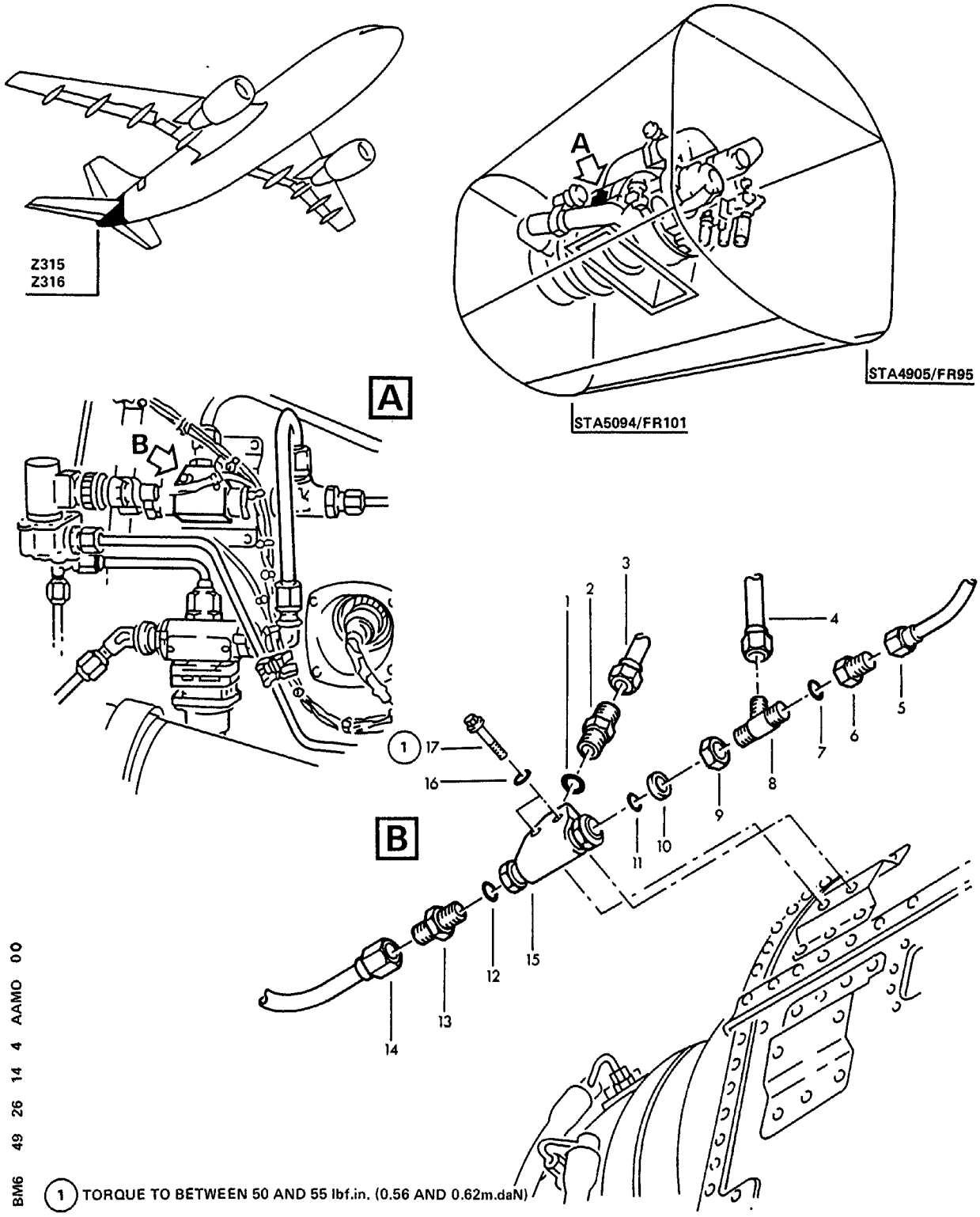
Referenced Procedures

- 12-13-49, P. Block 1	APU
- 49-10-00, P. Block 501	Power Plant

2. Procedure
(Ref. Fig. 401)
A. Job Set-Up

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Gearbox Shuttle Valve
Figure 401

B. Removal

NOTE : Fit blanking caps and plugs to all disconnected lines and open orifices.

(1)Disconnect PCD1 tube (14), buffer air tubes (3, 4) and gearbox pressure regulator tube (5).
(2)Remove union reducer (6) with O-ring (7). Discard O-ring.
(3)Remove bulkhead tee (8) with nut (9), retainer (10) and O-ring (11). Discard O-ring.
(4)Remove unions (2, 13).
(5)Remove and discard O-rings (1, 2).
(6)Remove bolts (17), washers (16) and shuttle valve (15).

C. Preparation for Installation

WARNING : CLEANING AGENT MAT. NO 11-002 IS DANGEROUS.

(1)Clean gearbox shuttle valve using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Check gearbox shuttle valve (15) for damage.
  (a)Replace if necessary.
(3)Check retainer (10) for damage.
  (a)Replace if necessary.

D. Installation

(1)Position shuttle valve (15) on plenum, install washers (16) and bolts (17).
(2)TORQUE bolts (17) to between 50 and 55 lbf.in. (0.56 and 0.62 m.daN).
  NOTE : Remove blanking caps and plugs from all disconnected lines and orifices.
(3)Install new O-rings (1, 12) onto unions (2, 13).
(4)Install unions (2, 13) into shuttle valve (15).
(5)Install nut (9), retainer (10) and new O-ring (11) onto bulkhead tee (8).
(6)Install bulkhead tee (8) into shuttle valve (15) and tighten nut (9).
(7)Install new O-ring (7) onto bulkhead tee (8).
(8)Install union reducer (6) onto bulkhead tee (8).
(9)Connect PCD 1 tube (14), buffer airtubes (3, 4) and gearbox pressure regulator tube (5) to shuttle valve (15).

E. Test

(1)Check oil level in gearbox sump.
  (a)Replenish if necessary (Ref. 12-13-49, P. Block 1).
(2)Start and operate APU (Ref. 49-10-00, P. Block 501).
(3)Check gearbox shuttle valve connection and pneumatic line connections for leakage. Leakage is not permissible.
(5)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags, and close circuit breakers 50KA, 1KD and 71KD.
(3)Close access doors 315AL and 316AR and remove access platform.

GEARBOX PRESSURE REGULATOR VALVE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Reason for the Job

A. Removal/Installation of Gearbox Pressure Regulator Valve

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Saftey Clips and Tags
C.	Blanking Caps and Plugs
D. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
E.	Torque Wrench up to 2.0 m.daN (177 lbf.in.)
F.	O-Rings
G.	Retainers

Referenced Procedures

- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

3. Procedure

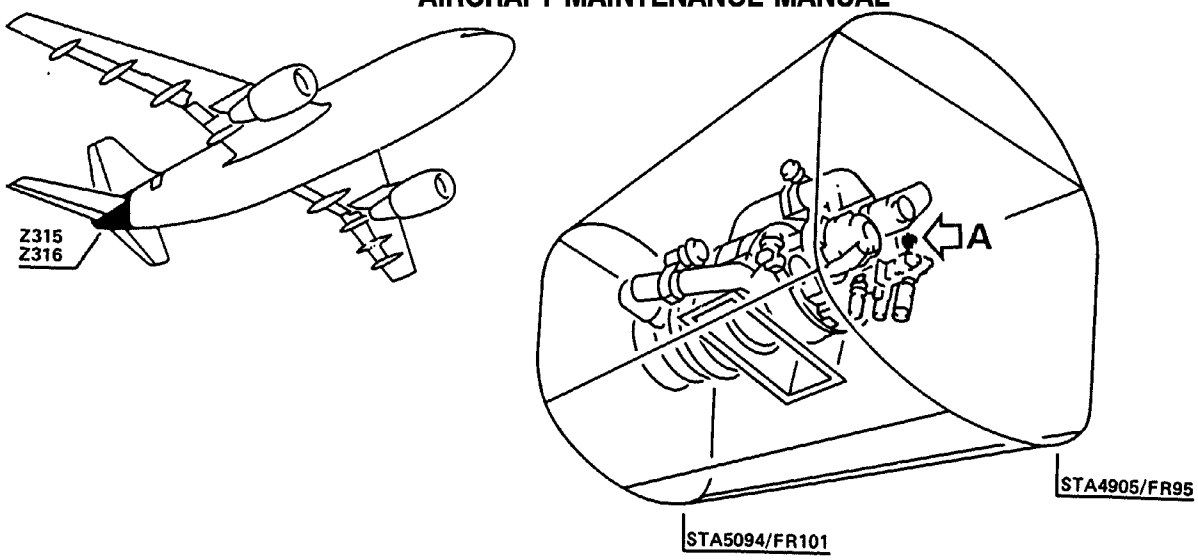
(Ref. Fig. 401)

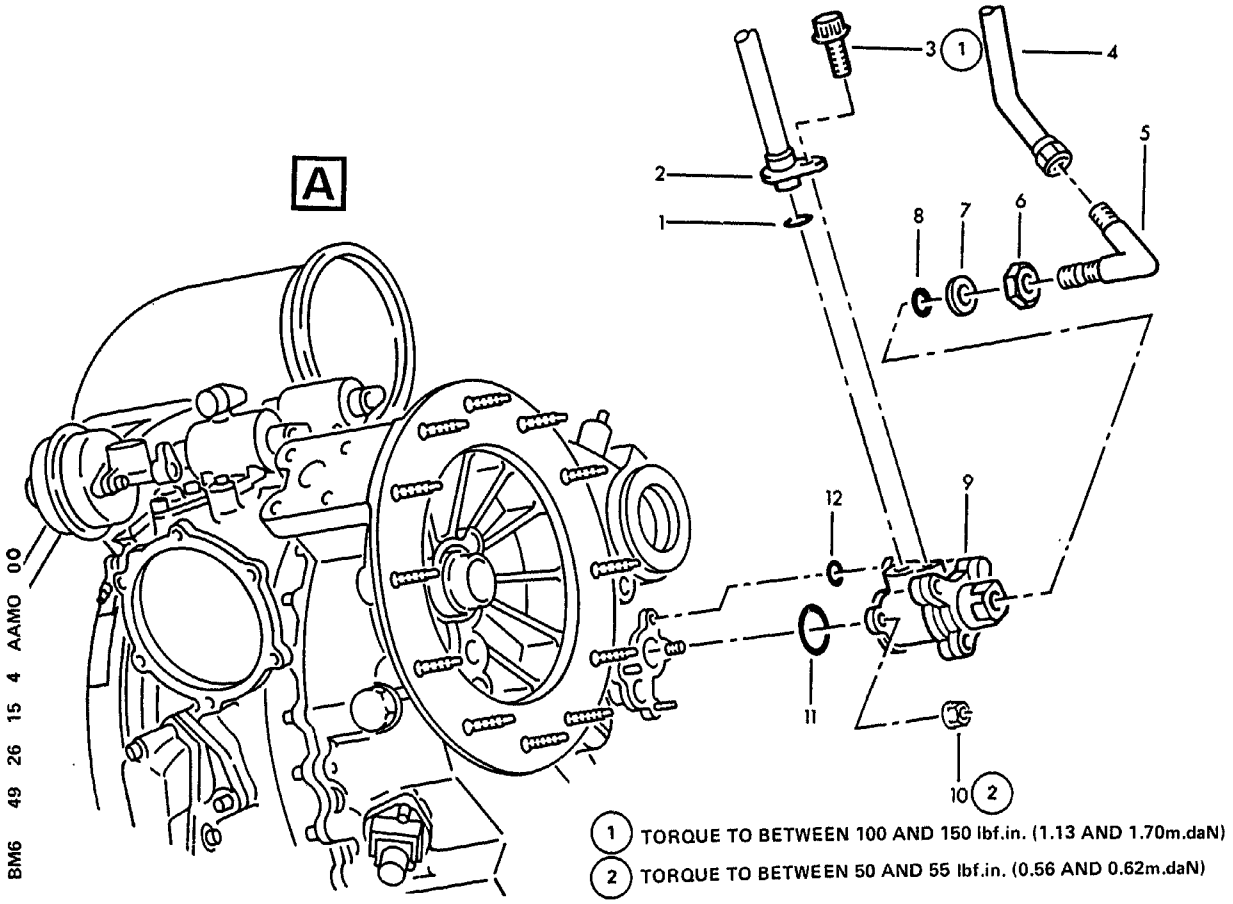
A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.





Gearbox Pressure Regulator Valve
Figure 401

B. Removal

NOTE : Fit blanking caps and plugs to all disconnected lines and open orifices.

(1)Disconnect gearbox pressure tube (4). Remove elbow (5) with nut (6), O-ring (8) and retainer (7). Discard O-ring.

(2)Remove bolt (3). Disconnect gearbox vent tube (2) with O-ring (1). Discard O-ring.

(3)Remove nuts (10), valve (9) with O-rings (11, 12). Discard O-rings.

C. Preparation for Installation

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(1)Clean valve using cleaning agent (Mat. No. 11-002) and dry compressed air.

(2)Check valve (9) for damage and cracks.

(3)Replace if neccessary.

D. Installation

(1)Install new O-rings (11, 12) into gearbox pressure regulator valve (9).

(a)Install valve onto engine and secure with nuts (10).

(b)TORQUE nuts (10) to between 50 and 55 lbf.in. (0.56 and 0.62 m.daN)

NOTE : Remove blanking caps and plugs from all disconnected lines and orifices.

(2)Install nut (6), retainer (7) and new O-ring (8) onto elbow (5).

(a)Install elbow into valve (9).

(b)Adjust until elbow is aligned with gearbox pressure tube (4).

(c)Connect gearbox pressure tube to elbow.

(d)Tighten nut (6) until elbow is secure.

NOTE : If necessary, replace retainer (7).

(3)Install new O-ring (1) onto fitting end of gearbox vent tube (2).

(a)Install into valve (9) and secure with bolt (3).

(b)TORQUE bolt (3) to between 100 and 150 lbf.in. (1.13 and 1.70 m.daN).

E. Test

(1)Check oil level in gearbox sump.

(a)Replenish if necessary (Ref. 12-13-49, P. Block 1).

(2)Start and operate APU (Ref. 49-10-00, P. Block 501).

(3)Check valve connections and gearbox pressure tube connection for leakage.

(4)Leakage is not permissible.

(5)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.

(2)Remove safety clips and tags, and close circuit breakers 50KA, 1KD and 71KD.

(3)Close access doors 315AL and 316AR and remove access platform.

1. General

Fuel supply for the APU fuel feed system is normally from the left wing tanks via aircraft fuel system (Ref. 28-00-00).

The APU fuel system, located at the APU, fed from the APU fuel feed system, provides metered fuel to maintain correct APU operation.

The APU fuel system is automatically controlled by the electronic control box (ECB) for timed acceleration in start sequence and governed speed control (Ref. 49-61-00). The fuel system provides high-pressure regulated fuel to the inlet guide vane (IGV) actuator to control the load compressor IGV's. In case of emergency, the fuel supply is interrupted by the fire shutoff valve.

2. Component Location
(Ref. Fig. 001, 002)
(Ref. Fig. 003)

**ON A/C 001-100,

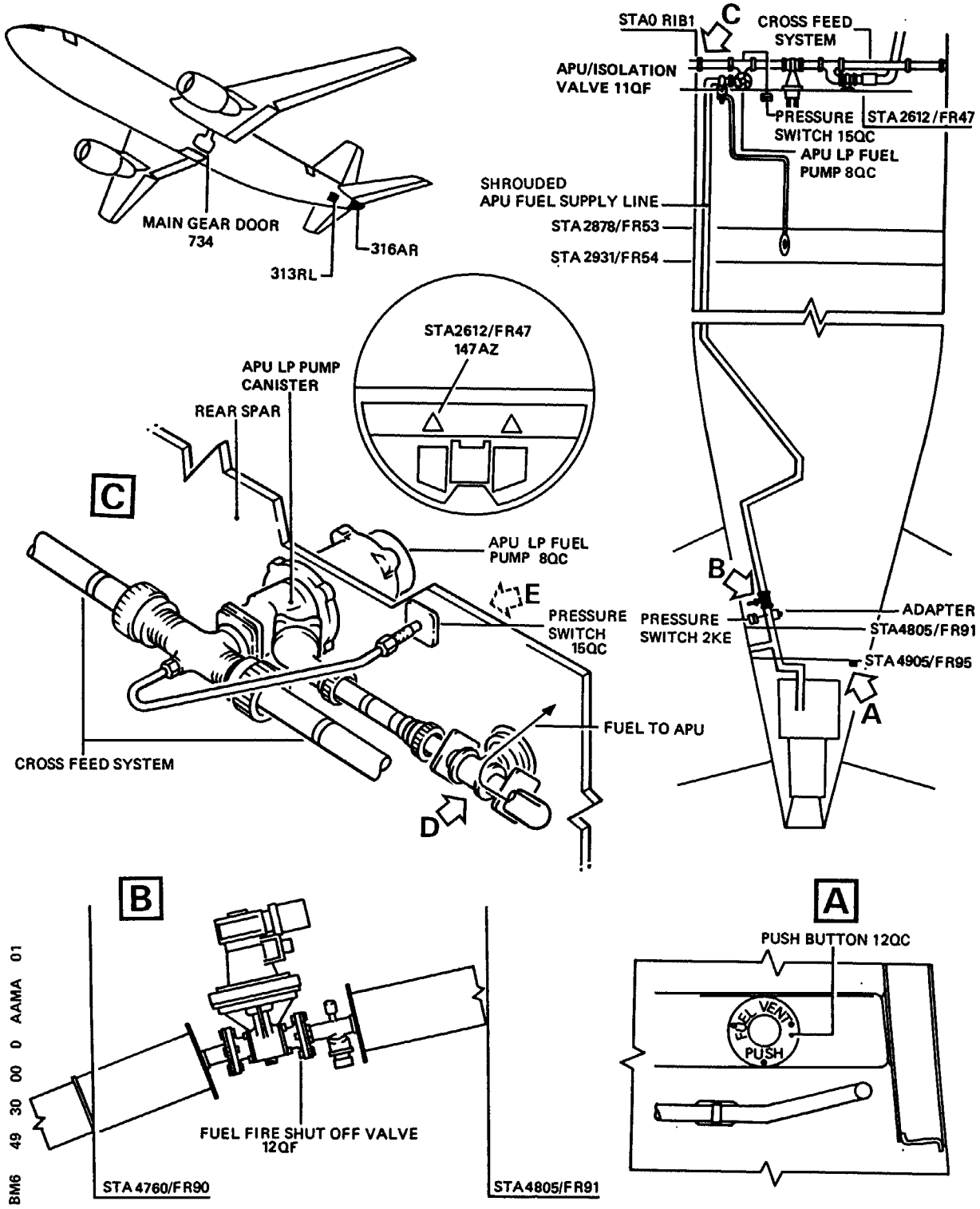
(Ref. Fig. 004)

**ON A/C 101-200,

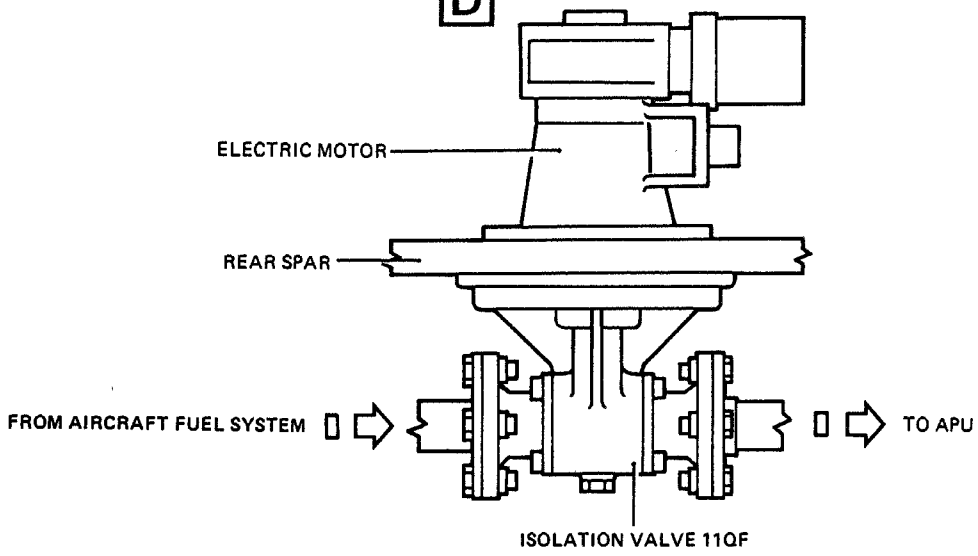
(Ref. Fig. 005)

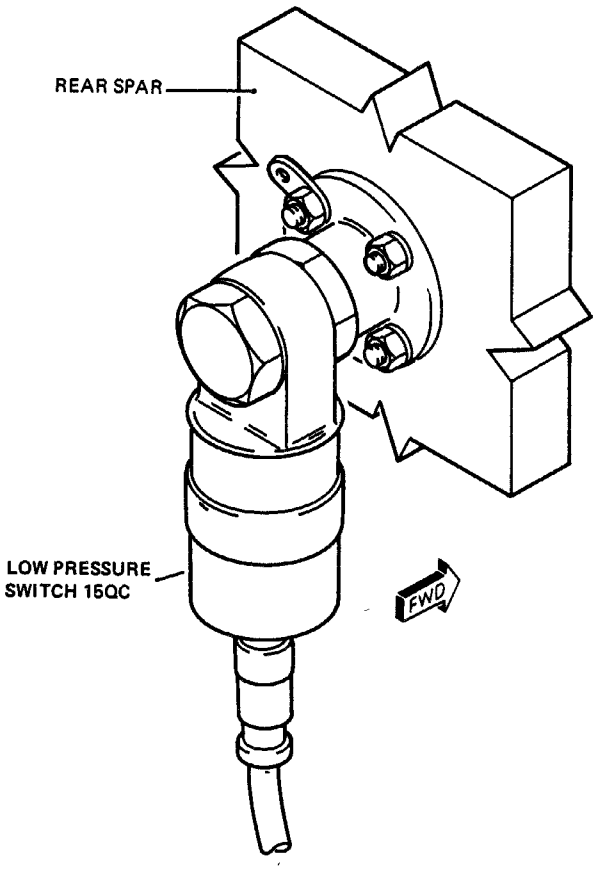
**ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	PRIMARY FUEL MANIFOLD AND NOZZLES		315	315AL	49-31-12
			316	316AR	
	SECONDARY FUEL MANIFOLD AND NOZZLES		315	315AL	49-31-13
			316	316AR	
	FUEL FILTER		315	315AL	49-31-14
	FUEL CONTROL UNIT		315	315AL	49-32-11
	FUEL FLOW DIVIDER AND DRAIN VALVE		315	315AL	49-32-12
59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11
2KE	SWITCH-FUEL PRESSURE		311		49-34-11
3QC	P/B SW FUEL PUMP-LO PR/OVRD	429VU	212		
4KD	RELAY-APU MAIN	107VU	121	132AZ	
5QC	RELAY-APU FUEL PUMP	282VU	121	132AZ	
5WF	RELAY-FIRE EMERG STOP	282VU	121	132AZ	
6QF	INDICATOR-APU POSITION	430VU	212		
6WF	RELAY-FIRE EMERG STOP	282VU	121	132AZ	
7QF	INDICATOR-ISOL VALVE POSITION	472VU	212		
8QC	PUMP-APU LP FUEL		147	734	49-32-15
				147EZ	
				147AZ	
11QF	VALVE-APU ISOLATION		147	734	49-33-11
				147EZ	
12QC	PUSHBUTTON-APU FUEL LINE VENT.		313	316AR	
12QF	VALVE-APU LOW PRESSURE FIRE SHUTOFF		311	313AL	49-33-12
13QC	RELAY-APU FUEL LINE VENT.	282VU	121	132AZ	
13QF	DIODE	282VU	121	132AZ	
14QF	DIODE	282VU	121	132AZ	
14KD	SWITCH-APU MASTER	429VU	212		
14QC	DIODE	282VU	121	132AZ	
15QC	PRESSURE SWITCH		147	734	49-32-15
				147AZ	



APU Fuel Feed System - Component Location
(Sheet 1/2)
Figure 001





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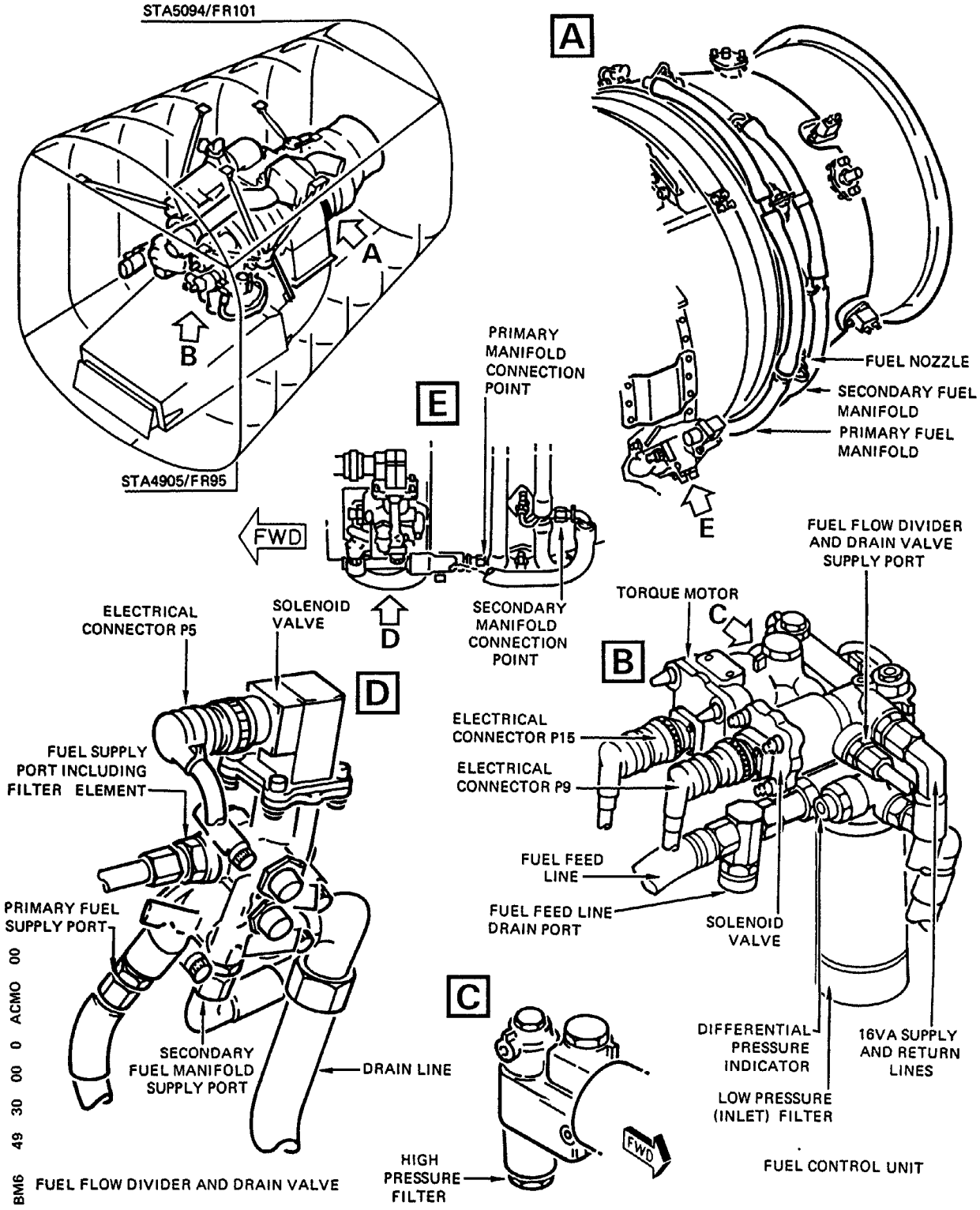
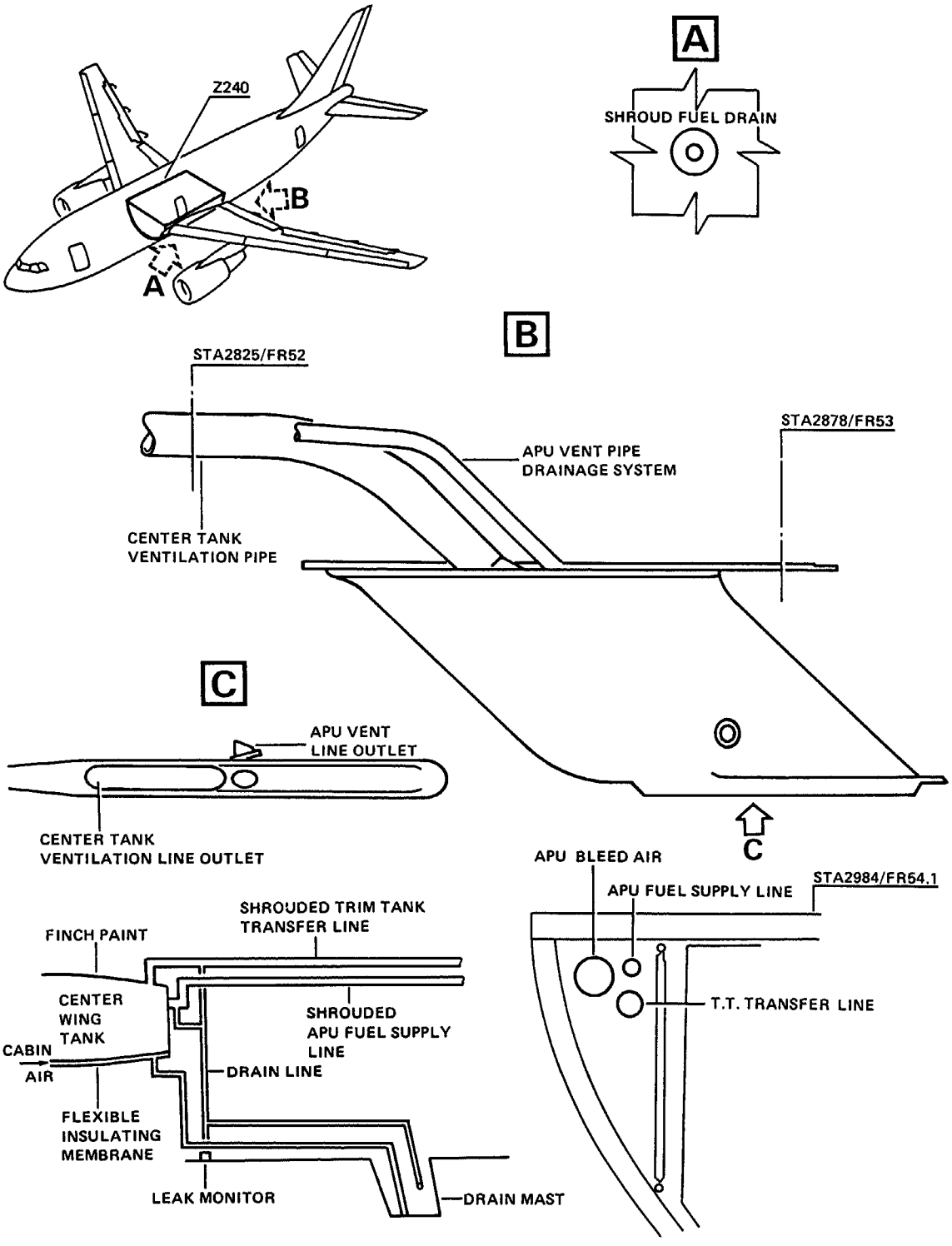
APU Fuel Feed System - Component Location
(Sheet 2/2)
Figure 001



APU Fuel System - Component Location
Figure 002



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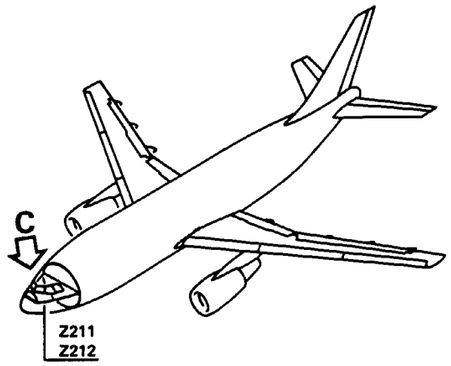
Shrouded APU Fuel Supply Line and Trim Tank
Transfer Line Drain System
Figure 003



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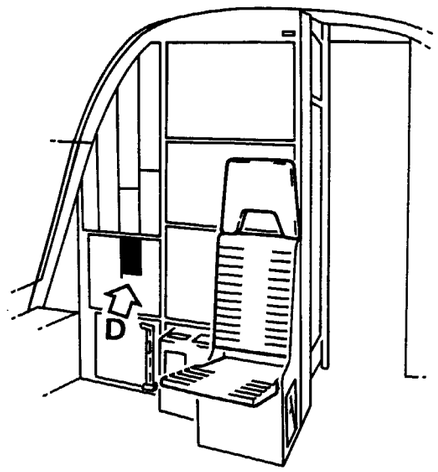

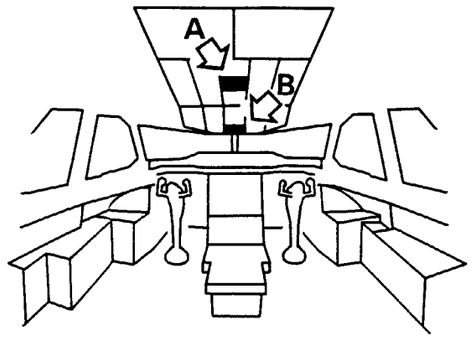

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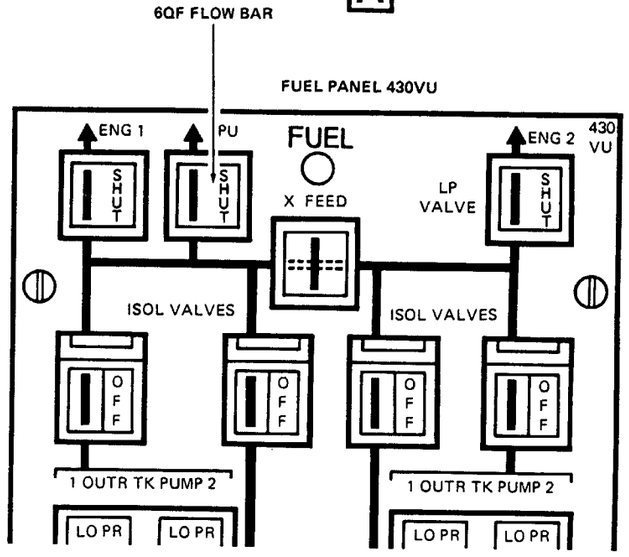

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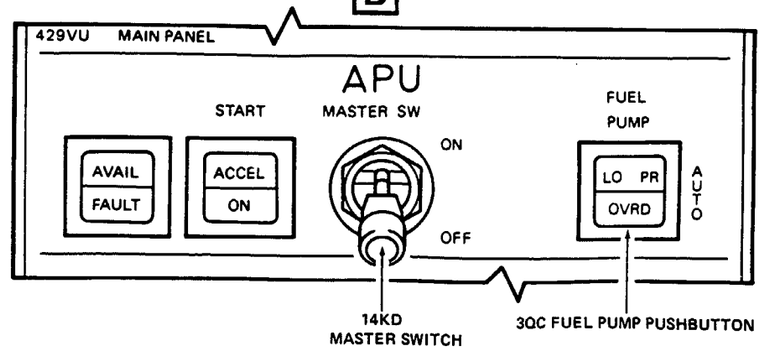
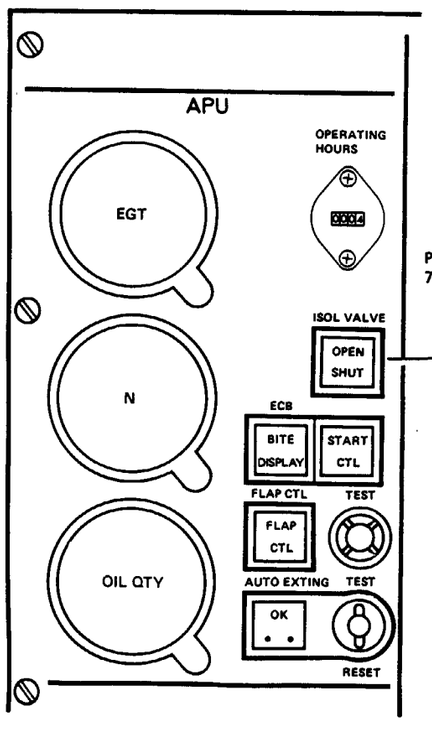
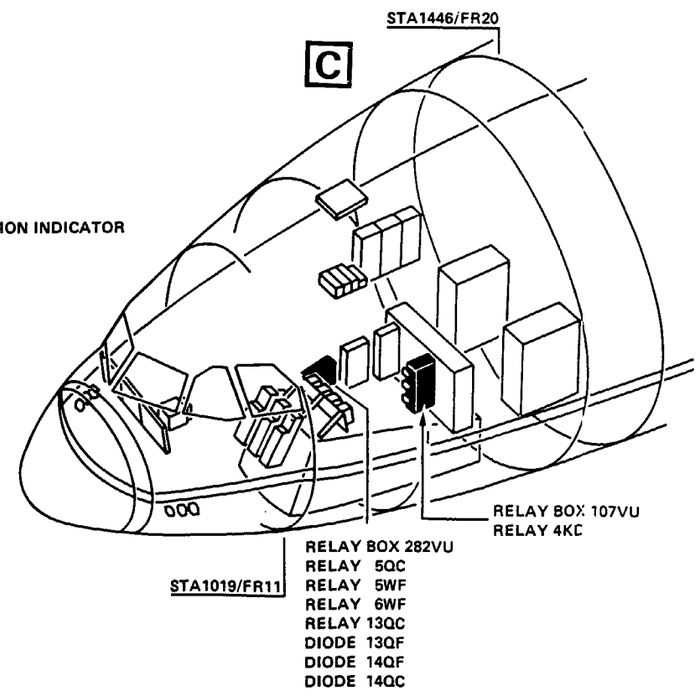


APU MAINTENANCE PANEL 472VU





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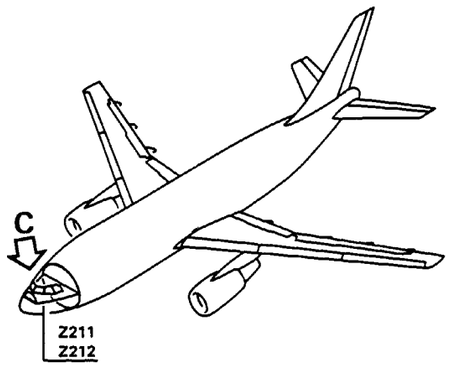
Engine Fuel and Control
Figure 004



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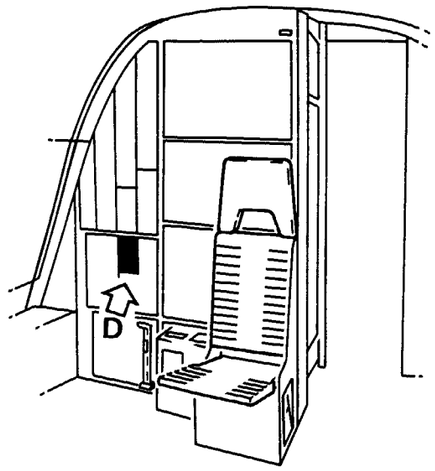

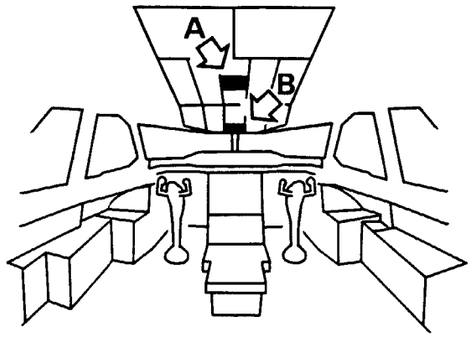

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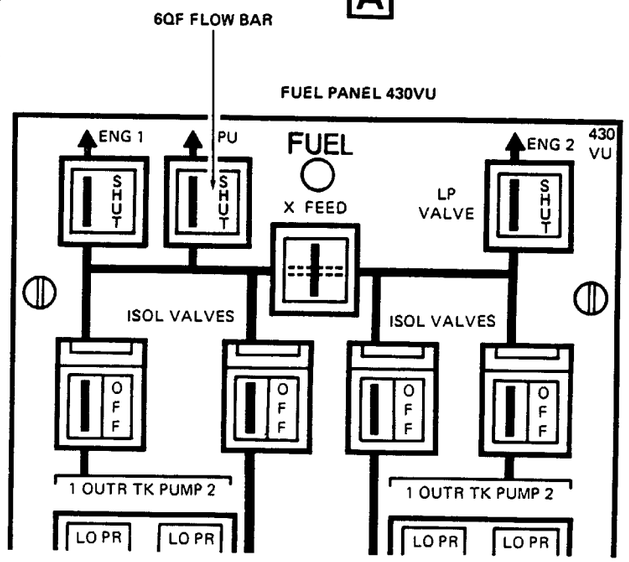

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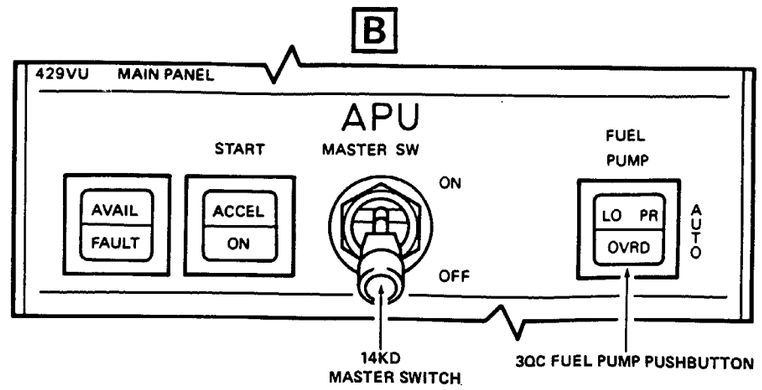
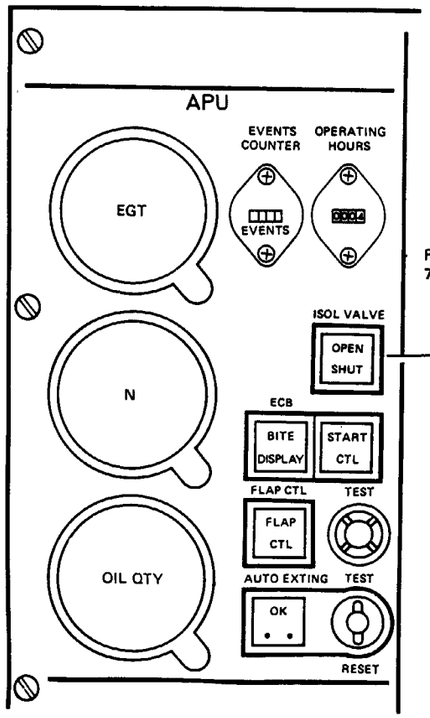
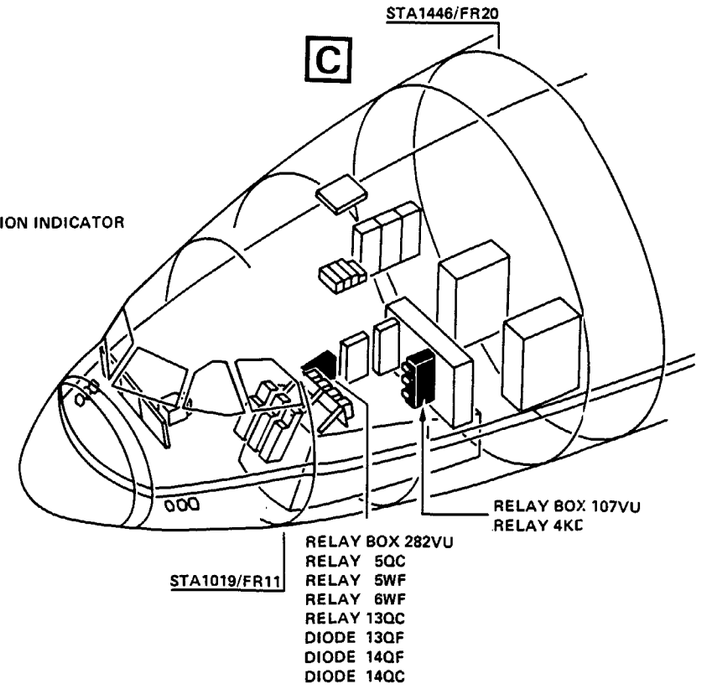


APU MAINTENANCE PANEL 472VU



POSITION INDICATOR 7QF

C



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Engine Fuel and Control
Figure 005

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3. Description

(Ref. Fig. 001)

A. APU Fuel Feed System

The APU fuel feed system obtains fuel from the left wing tanks via aircraft fuel system. By opening crossfeed valve, fuel from the right tanks can be used. Fuel tank booster pumps or APU LP fuel pump 8QC supply APU fuel feed system. The APU fuel feed system consists of APU LP fuel pump 8QC, isolation valve 11QF, fire shutoff valve 12QF, pressure switches 15QC, 2KE and fuel feed line.

(Ref. Fig. 002)

B. APU Fuel System

The APU fuel system located on the APU consists of a Fuel Control Unit (FCU), fuel flow divider, primary and secondary manifolds and nozzles. The APU fuel system provides the correct amount of fuel flow to ensure initial combustion, acceleration and on-speed governing. The actuator pressure regulator installed in the fuel control unit provides high pressure fuel to the inlet guide vane actuator for maintaining the load compressor inlet guide vanes to the bleed air demand.

4. Component Description

(Ref. Fig. 001)

A. APU LP fuel Pump 8QC

The APU LP fuel pump is a centrifugal pump, driven by a single-phase 115 V motor. This motor is powered either from the normal aircraft electrical network, or by the aircraft batteries via an inverter. The fuel pump is located at the rear spar of the center wing (center tank).
APU LP fuel pump 8QC can be operated via pushbutton switch 12QC to purge APU fuel feed system for maintenance purposes. Pushbutton switch 12QC is located in the APU compartment at FR95.

(Ref. Fig. 001)

B. Pressure Switch 15QC

The pressure switch is located at the rear spar of the center wing (center tank) with LP fuel pump 8QC and isolation valve 11QF. The pressure switch activates the APU LP fuel pump 8QC if fuel pressure in APU fuel feed line is below 22 psi and APU MASTER SW switch 14KD is ON.

(Ref. Fig. 001)

C. APU Isolation Valve 11QF

The 28 V DC electrically operated, spherical plug-type isolation valve, located at the rear spar of the center wing (center tank), prevents the APU fuel feed line being pressurized if APU MASTER SW switch 14KD is OFF.

(Ref. Fig. 001)

D. LP Fuel Fire Shut-Off Valve 12QF

The LP fuel fire shutoff valve, located between STA 4760 (FR90) and STA4805 (FR91), isolates APU fuel feed line in the event of an emergency. The electrically operated, spherical type valve is controlled by the APU FIRE handle on APU FIRE control module 20WG or on ground by the automatic fire extinguisher system.

(Ref. Fig. 001)

E. Low Pressure Switch 2KE

The low pressure switch, located between STA4760 (FR90) and STA4805 (FR91), is a differential pressure switch referenced to ambient pressure at its location in the unpressurized rear fuselage. At 6 psi or less fuel pressure in the APU fuel feed line, the low pressure switch contacts change-over and on APU main panel 429VU FUEL PUMP indicator 3QC, LO-PR comes on.

(Ref. Fig.)

F. Shrouded APU Fuel Supply Line - Drain System

(1) The shrouded APU fuel supply line is connected to the rear center wing tank. The shrouded drain line is connected here at the lowest point of the system. Any fuel flowing from the shroud passes through the drain line and then out to the atmosphere through the drain mast.

(Ref. Fig. 003)

G. Shrouded APU and Trim Tank Supply Line - Drain System

(1) The shrouded APU fuel supply line and trim tank transfer line are connected to the rear of the center wing tank. The shroud/drain lines are connected here at the lowest point of the system. Any fuel flowing from the shrouds passes through the drain lines and is detected by a leak monitor. It then passes out to the atmosphere through the drain mast.

(Ref. Fig. 002)

H. Fuel Control Unit (FCU)

(1) The fuel control unit provides metered fuel for APU operation via the flow divider to the fuel nozzles and high pressure regulated fuel to the IGV actuator. The metered fuel for APU operation and regulated high pressure fuel to the IGV actuator are analog to the received signal from the ECB.

The FCU contains:

- inlet fuel filter
- relief valve
- delta pressure indicator
- HP pump (gearbox driven)
- HP filter
- torque motor metering valve
- delta pressure regulator valve
- pressurizing valve
- fuel solenoid valve.

The FCU is installed at the oil pump flange.

(2) Relief Valve

The relief valve protects components, downstream of the high pressure pump.

(3)HP Fuel Pump
The gearbox driven high pressure fuel pump is a fuel lubricated, two gear rotary pump.

(4)Torquemotor Metering Valve
The metering function is accomplished by the use of a balanced clevis, which is moved across an elongated orifice. The clevis is controlled by an electronic torquemotor. Increasing current to the torquemotor moves the clevis to increase the orifice area, and decreasing the current, decreases the orifice area. At zero current, the clevis moves to its lowest stop and exposes an orifice area large enough to provide minimum fuel flow.

(5)Delta Pressure Regulator Valve
The function of the delta pressure regulator valve is to by-pass back to the filter inlet that portion of fuel not used to support combustion. It also provides a constant pressure difference across the metering valve. The by-passed fuel assures de-icing of the inlet filter and the fuel control unit.

(6)Pressurizing Valve
The pressurizing valve ensures that the appropriate fuel pressure is available to the system when the fuel solenoid valve is open.

(7)Fuel Solenoid Valve
The fuel solenoid valve is a normally closed, electrically opened solenoid valve. During the APU start sequence, the solenoid valve will receive a command signal from the ECB to open at seven percent RPM.

J. Fuel Flow Divider
(Ref. Fig. 002)
The purpose of the flow divider is to sequence and distribute fuel to the primary and secondary manifolds. Incorporated in the flow divider are built-in manifold drain valves which drain both the primary and secondary manifolds during shutdown to prevent coking of the fuel nozzles.
The flow divider consists of a:
- filter
- start sequence valve
- run sequence valve
- primary drain valve
- secondary drain valve
- normally closed solenoid valve.

The flow divider is mounted to the combustor heat shield at the eight o'clock position.

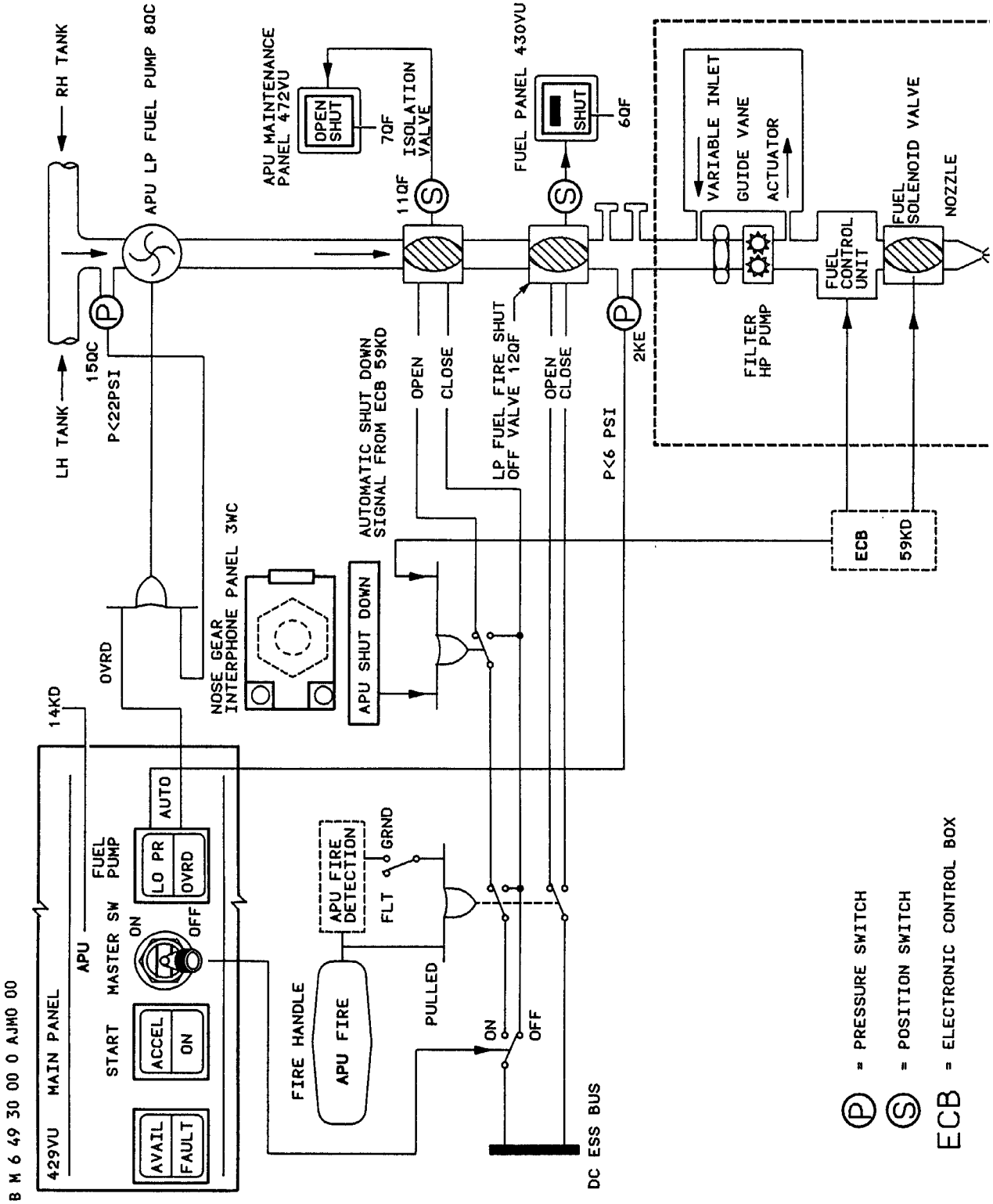
K. Fuel Manifold and Nozzles
(Ref. Fig. 002)
Metered fuel flows thru the primary and secondary fuel manifolds and is injected into the combuster by the primary and secondary fuel nozzles. To obtain optimum fuel distribution, the fuel nozzles are inserted in equally spaced positions around the combustor plenum.

5. Operation
(Ref. Fig. 006)
(Ref. Fig. 007)
(Ref. Fig. 008)
(Ref. Fig. 009)

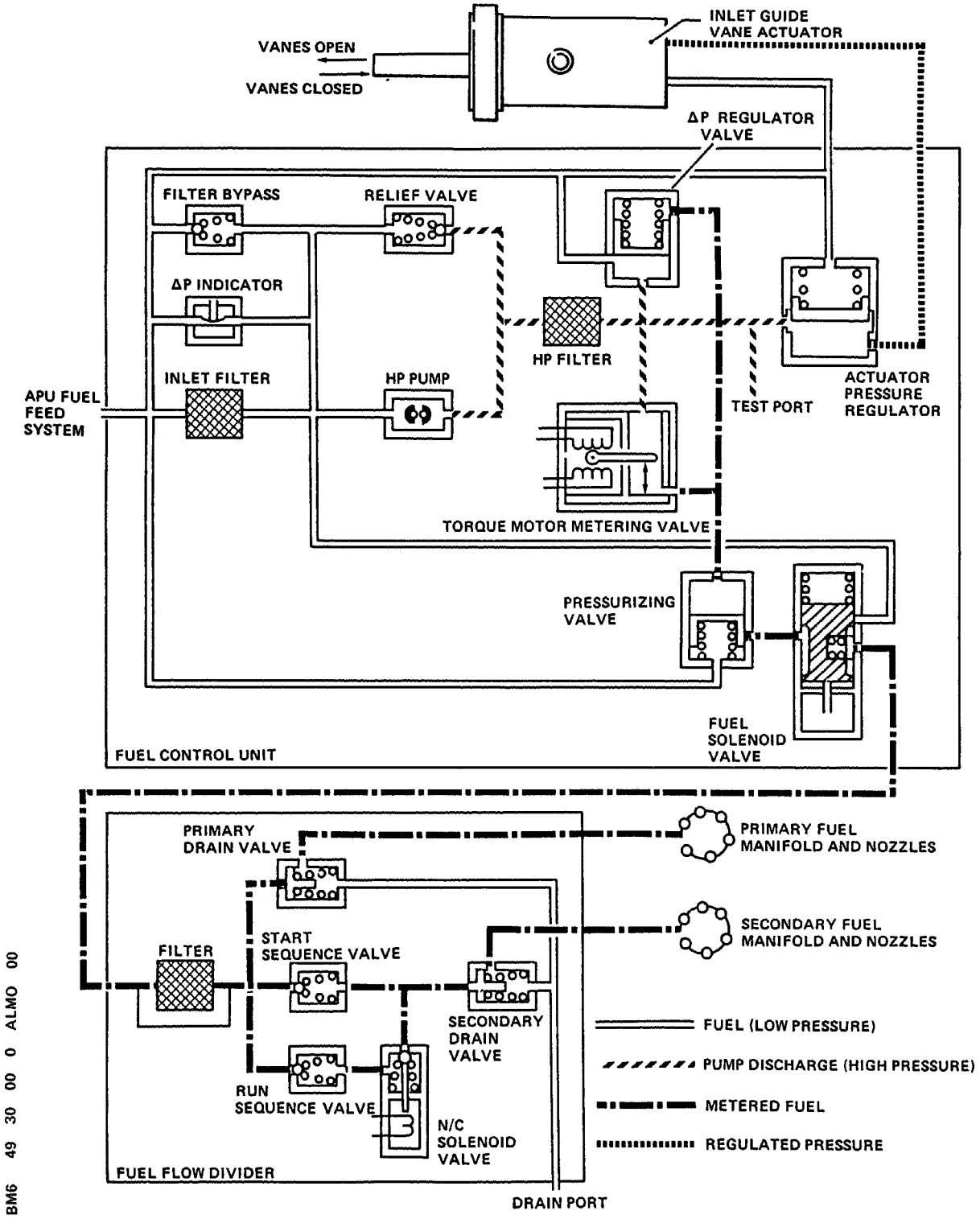
A. Normal Operation Condition
On APU panel 429VU:
(1)APU MASTER SW switch 14KD in ON position:
- Isolation valve 11QF opens
- on maintenance panel 472VU ISOL VALVE position indicator 7QF OPEN comes on.

(2)FUEL PUMP switch 3QC in AUTO position either:
- fuel tank pumps operate and APU LP fuel pump 8QC is armed
- or pressure switch 15QC senses that fuel pressure in APU fuel feed line is below 22 psi, and then APU LP fuel pump 8QC operates automatically.

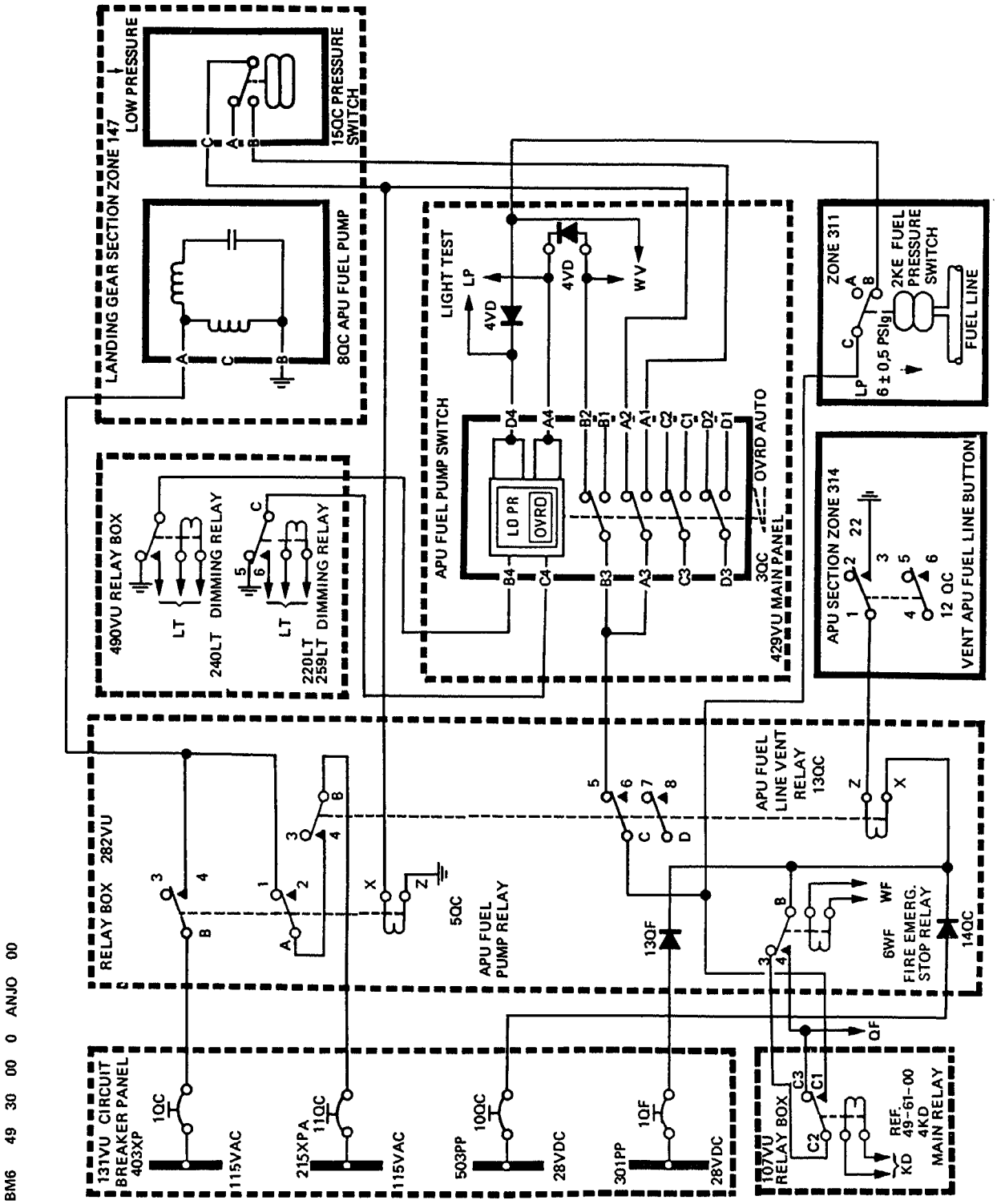
When the master switch 14KD is in ON position and the START pushbutton switch 2KA is pressed, the engine begins to rotate. At seven percent engine speed, power is supplied to energize the fuel solenoid valve to the open position. Fuel from the pressurizing valve flows through the flow divider start sequence valve where it is directed to the primary fuel nozzles. At the same time, ignition commences, combustion occurs, and the engine continues to accelerate.
As the engine accelerates, the ECB 59KD sends a signal to the torque motor metering valve in the fuel control unit to control metered fuel flow. Until governed speed is reached, fuel flow is maintained by the fuel acceleration control located in the ECB.
Reaching a preset fuel flow level, the flow divider run sequence valve opens and allows fuel to flow to the secondary nozzles in parallel with the primary nozzles.
At 50 percent governed speed, the engine starter motor 8KA disengages and the engine continues to accelerate without assistance to 100 percent speed.
Speed is kept constant at 100 percent by the fine speed and proportional governors in the ECB which signal the fuel control unit for an increase or decrease of fuel flow as load demand requires.



APU Fuel Feed System - Schematic
Figure 006



APU Fuel System - Schematic
Figure 007



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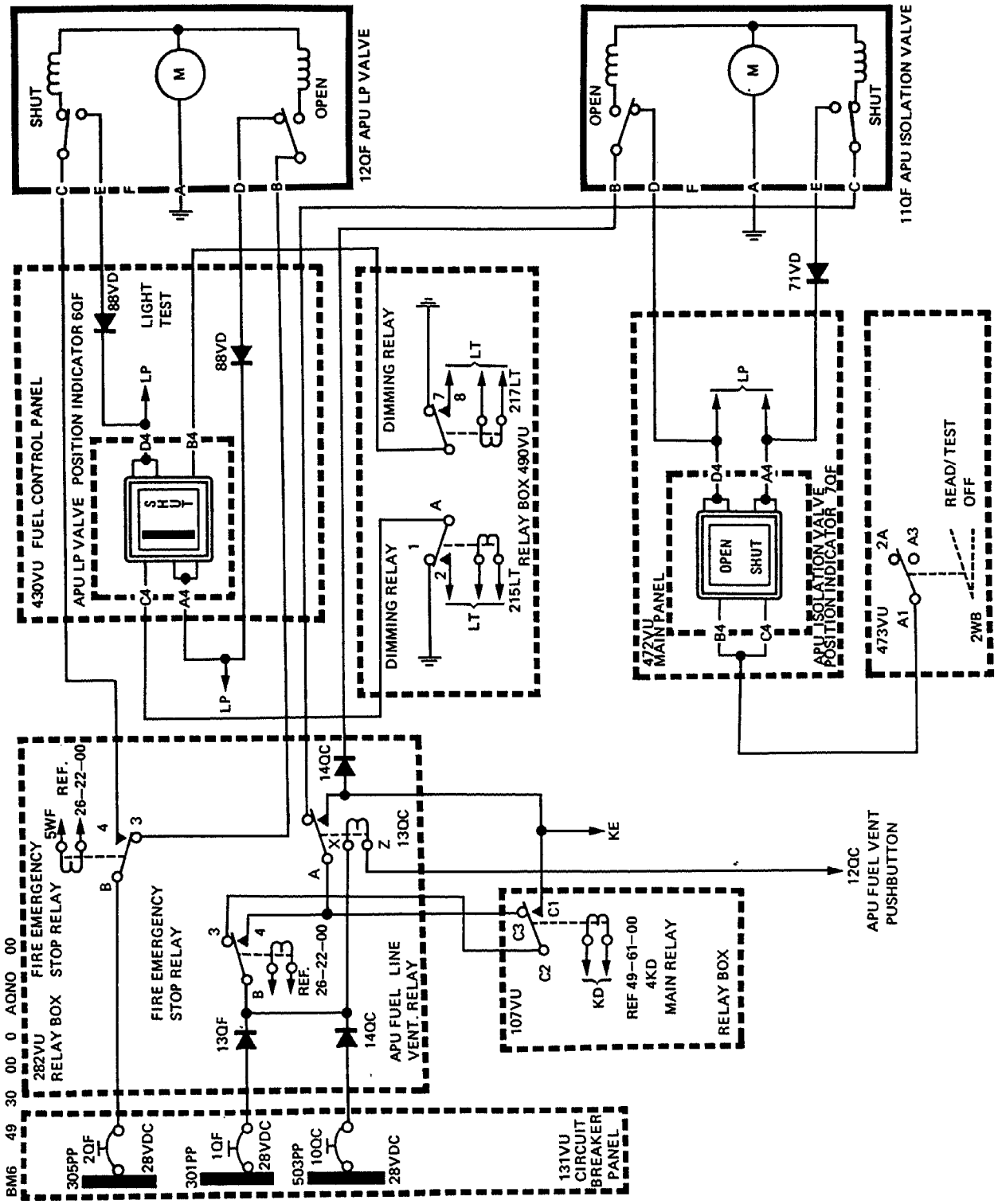
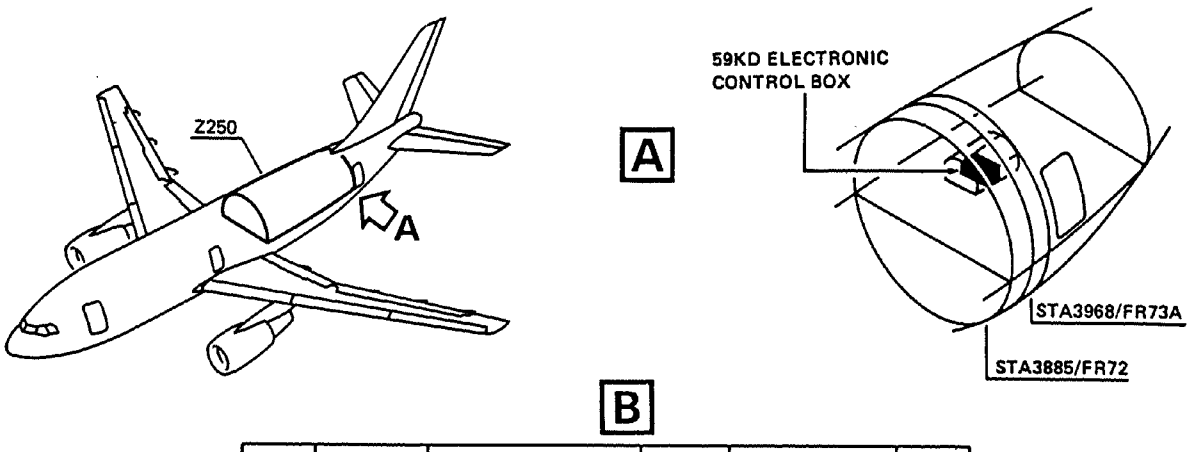
APU Fuel Pump Control - Schematic Diagram
Figure 008

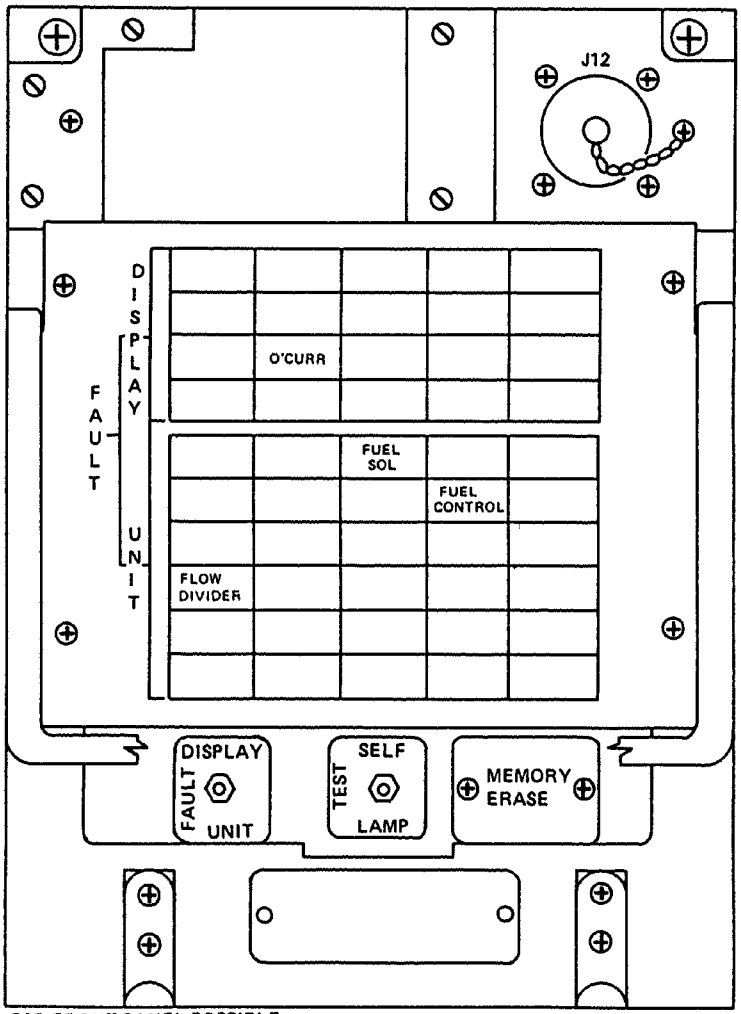


APU Fuel Fire Shutoff Control - Schematic Diagram
Figure 009

B. Abnormal Condition
(Ref. Fig. 010)
(1)Low pressure in fuel feed line:
When pressure switch 15QC senses fuel pressure is below 22 psi, the APU LP fuel pump 8QC operates automatically. If fuel pressure is below 6 psi and pressure switch 15QC is faulty, pressure switch 2KE senses this and switches on FUEL PUMP pushbutton switch 3QC LO PR warning. By pressing FUEL PUMP pushbutton switch 3QC to OVRD the APU LP fuel pump 8QC operates continuously.
(2)The following failures in the APU fuel system will be monitored on the ECB 59KD in the prestart and the self-test routines (Ref. 49-61-00):
- torquemotor metering valve
- fuel solenoid valve
- fuel flow divider
- N/C solenoid valve.

C. In Emergency Conditions
On overhead panel APU FIRE control module panel 20WG by pulling APU FIRE handle or on ground by the automatic fire exinguishing system:
- Fire shutoff valve (12QF) closes
- APU indicator (6QF) on FUEL panel 430VU SHUT comes on
- Isolation valve (11QF) closes
- Position indicator ISOL VALVE (7QF) on maintenance panel 472VU SHUT comes on
- Emergency shutdown is initiated (Ref. 49-62-00).





ECB FRONT PANEL POSSIBLE FAULT ILLUMINATION FOR FUEL SYSTEM

BM6 49 30 00 0 AWAO 00

ECB - Fault Illumination
Figure 010

R FUEL DISTRIBUTION - ADJUSTMENT/TEST
R

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

BEFORE PRESSURIZING FUEL AND HYDRAULIC SYSTEMS, MAKE CERTAIN THAT FUEL AND HYDRAULIC SYSTEM UNDER MAINTENANCE HAS BEEN ISOLATED.

BEFORE BEGINNING THE TESTS MAKE CERTAIN THAT THE TEST EQUIPMENT IS FURNISHED WITH A SAFETY SYSTEM ENABLING THE ABSORPTION OF ANY POSSIBLE OVERPRESSURE WHICH MIGHT DAMAGE THE AIRCRAFT COMPONENT UNDER TEST.

CHECK THAT THE LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, THE PRESCRIBED SAFETY PRECAUTIONS MUST BE RIGOROUSLY OBSERVED (REF. 28-00-00, P. BLOCK 301).

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEMS, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Operational Test

A. APU Pump Test
(1)Reason for the job
Check of APU pump control.
(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform 2.5 m (8 ft. 4 in.)
(b)	Access Platform 6.5 m (21 ft. 5 in.)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

(3)Procedure
(a)Job set-up
1 Open left main landing gear door (Ref. 32-12-11, P. Block 301).
2 Position access platforms at zone 313 and zone 147.
3 Open APU compartment access doors 315AL and 316 AR.
4 On APU section of panel 429VU, make certain that MASTER SW is in OFF

position.
5 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
6 Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FIRE EXTING/SQUIB/TEST	7WF	318/A60
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63
131VU	APU/WARN	2KD	317/B56
131VU	APU/ECB/SUPPLY/MAIN	1KD	317/B57

(b)Test

ACTION	RESULT
1. In zone 313, in APU compartment press APU fuel line vent (FUEL/VENT/PUSH) pushbutton switch 12QC for 30 seconds maximum.	In zone 147 - aurally check that APU fuel pump 8QC operates.
2. In zone 313, release APU fuel line vent pushbutton switch.	In zone 147 - aurally check that APU pump 8QC no longer operates.
3. On APU section of panel 429VU - place MASTER SW in ON position - release FUEL PUMP pushbutton switch.	In zone 147 - aurally check that APU pump 8QC operates.
4. On overhead panel - pull APU FIRE handle 20WG	In zone 147 - aurally check that APU pump 8QC no longer operates.
5. On overhead panel - push APU FIRE handle 20WG and seal handle	In zone 147 - aurally check that APU pump 8QC operates
6. On APU section of panel 429VU - place MASTER SW in OFF position	In zone 147 - aurally check that APU pump no longer operates.

(c)Close-up
1 On APU section of panel 429VU select FUEL PUMP pushbutton switch in AUTO configuration (pressed (in)).
2 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
3 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

4 Close access doors 315AL and 316AR.
5 Remove access platforms.
6 Close left main gear door (Ref. 32-12-11, P. Block 301).
7 Make certain that circuit breakers 1WF, 2WF, 7WF, 2QF, 2KD, 1KD are closed.
- Make certain that APU FIRE handle 20WG is sealed.

B. APU Isolation Valve Test

(1)Reason for the job

- Check of isolation valve control and indicating system.

(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 2.5 m (8 ft. 4 in.)
(b)	Access Platform 6.5 m (21 ft. 5 in.)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

(3)Procedure

(a)Job set-up

1 Open left main landing gear door (Ref. 32-12-11, P. Block 301).

2 Position access platforms at zones 147 and 313.

3 Open APU compartment access doors 315AL and 316AR.

4 On APU section of panel 429VU, make certain that MASTER SW is in OFF position.

5 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

6 Open, safety and tag the following circuit breakers.

PANEL	SERVICE	IDENT.	LOCATION
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FIRE EXTING/SQUIB/TEST	7WF	318/A60
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63
131VU	APU/WARN	2KD	317/B56
131VU	APU/ECB/SUPPLY/MAIN	1KD	317/B57

(b)Test

ACTION	RESULT
1. On maintenance panel 472VU - place ANN LT switch in READ position.	In zone 147 - index of APU isolation valve 11QF motor indicates SHUT. On APU section of panel 472VU - SHUT legend of ISOL VALVE annunciator 7QF is on.
2. On overhead panel - pull APU FIRE handle 20WG	- No change.
3. On overhead panel - push APU FIRE handle 20WG.	- No change.
4. In zone 313, in APU compartment - press and hold APU fuel line vent pushbutton switch 12QC.	In zone 147 - index of APU isolation valve 11QF motor indicates OPEN. On APU section of panel 472VU - OPEN legend of ISOL VALVE annunciator 7QF is on.
5. In zone 313 - release APU fuel line vent pushbutton switch 12QC.	In zone 147 - index of APU isolation valve 11QF motor indicates SHUT. On APU section of panel 472VU - SHUT legend of ISOL VALVE annunciator 7QF is on.
6. On APU section of panel 429VU - place MASTER SW in ON position	In zone 147 - index of APU isolation valve 11QF motor indicates OPEN. On APU section of panel 472VU - OPEN legend of ISOL VALVE annunciator 7QF is on.
7. On overhead panel - pull APU FIRE handle 20WG	In zone 147 - index of APU isolation valve 11QF motor indicates SHUT. On APU section of panel 472VU - SHUT legend of ISOL VALVE annunciator 7QF is on.
8. On overhead panel - push APU FIRE handle 20WG	In zone 147 - index of APU isolation valve 11QF motor indicates OPEN. On APU section of panel 472VU - OPEN legend of ISOL VALVE annunciator 7QF is on.

ACTION	RESULT
9. On APU section of panel 429VU - place MASTER SW in OFF position	In zone 147 - index of APU isolation valve 11QF motor indicates SHUT. On APU section of panel 472VU - SHUT legend of ISOL VALVE annunciator is on.
10. On maintenance panel 472VU - place ANN LT switch in OFF position.	On APU section of panel 472VU - SHUT legend of ISOL VALVE annunciator 7QF goes off.

(c) Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
3 Close access doors 315AL and 316AR.
4 Remove access platforms
5 Close left main gear door (Ref. 32-12-11, P. Block 301).
6 Close circuit breakers 1WF, 2WF, 7WF, 2QF, 2KD and 1KD.
7 Seal APU FIRE handle 20WG.

C. APU Fuel LP Valve Test

(1)Reason for the job

- check of APU fuel LP valve control and indicating system.

(2)Equipment and materials

ITEM	DESIGNATION
(a) Referenced Procedure - 24-41-00, P. Block 301	Access Platform 6.5 m (21 ft. 5 in.) AC External Power Control

(3)Procedure

(a)Job set-up

1 Position 6.5 m (21ft. 5in.) access platform under access door 313AL. Open access door 313AL.

2 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

3 On APU section of panel 429VU, make certain that MASTER SW is in OFF position.

4 On overhead panel, make certain that APU FIRE handle 20WG is pushed.

5 Open safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FUEL LP/VALVE/CTL	4WF	318/A62

(b)Test

ACTION	RESULT
1. Close circuit breaker 2QF	- index of APU fuel LP valve motor 12QF indicates OPEN (zone 313). On FUEL section of panel 430VU - flowbar of APU/LP VALVES annunciator 6QF is on.
2. Close circuit breaker 4WF On ECAM control panel press FUEL push-button switch.	- FUEL page appears on right ECAM display unit.
3. On overhead panel - pull APU FIRE handle 20WG.	- index of APU fuel LP valve motor 12QF indicates SHUT. (zone 313). On FUEL section of panel 430VU - SHUT legend of APU/LP VALVES annunciator 6QF comes on. On right ECAM display unit - APU LP valve symbol is crossline and amber (valve closed)
4. Open and safety circuit breaker 2QF	- index of APU fuel LP valve motor 12QF still indicates SHUT On FUEL section of panel 430VU - SHUT legend of APU/LP VALVES annunciator 6QF is off.
5. Close circuit breaker 2QF.	On FUEL section of panel 430VU - SHUT legend of APU/LP VALVES annunciator 6QF is on.
6. Open and safety circuit breaker 4WF	- Index of APU fuel LP valve motor 12QF indicates OPEN. On FUEL section of panel 430VU - flowbar of APU/LP VALVES annunciator 6QF is on.
7. Close circuit breaker 4WF	- Index of APU fuel LP valve motor 12QF indicates SHUT. On FUEL section of panel 430VU - SHUT legend of APU/LP VALVES annunciator 6QF is on. On right ECAM display unit - APU LP valve symbol is crossline and amber (valve closed).
8. Push APU FIRE handle 20WG and seal handle	- Index of APU fuel LP valve motor 12QF indicates OPEN. On FUEL section of panel 430VU - flowbar of APU/LP VALVES annun-

ACTION	RESULT
	ciator 6QF is on. On right ECAM display unit APU LP valve is in line (valve open).

(c)Close-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
3 Close access door 313AL.
4 Remove access platform.
5 Close circuit breakers 1WF, 2WF.

2. Functional Test

A. APU Fuel Pump (Controlled from Ground).

(1)Reason for the job

Check of APU pump circuitry (control from ground).

(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 6.5 m (21 ft. 5 in.)
(b)	Access Platform 2.5 m (8 ft. 4 in.)
(c)	Voltmeter 115VAC
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

(3)Procedure

(a)Job set-up

1 Open left main landing gear door (Ref. 32-12-11, P. Block 301).

2 Position access platforms at zones 147 and 313.

3 On APU section of panel 429VU, make certain that MASTER SW is in OFF position.

4 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

5 Disconnect connector 8QC-A from APU pump and connect terminals A and B to 115VAC voltmeter.

(b)Test

ACTION	RESULT
1. In APU compartment, press and hold APU fuel line vent (FUEL/VENT/PUSH) pushbutton switch 12QC.	In zone 147 - voltmeter indicates 115VAC.
2. On panel 124VU - open circuit breaker 11QC (FUEL/ BLOW OFF/PUMP).	In zone 147 - voltmeter indicates 0V.
3. On panel 124VU - close circuit breaker 11QC.	In zone 147 - voltmeter indicates 115VAC.
4. On panel 124VU - open circuit breaker 1QF (FUEL/ISOL VALVE).	In zone 147 - voltmeter indicates 115VAC.
5. On panel 124VU - close circuit breaker 1QF	In zone 147 - voltmeter indicates 115VAC.
6. Release pushbutton switch 12QC	In zone 147 - voltmeter indicates 0V.

(c)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Disconnect voltmeter and connect connector 8QC-A to APU pump 8QC.
3 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
4 Remove access platform.
5 Close left main landing gear door (Ref. 32-12-11, P. Block 301).

B. APU Pump

(1)Reason for the job

Check of APU pump circuitry and indication by means of FUEL PUMP pushbutton switch and APU FIRE handle.

(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 2.5 m (8 ft. 4 in.)
(b)	Voltmeter 115VAC
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

(3)Procedure

(a)Job set-up

1 Open left main landing gear door (Ref. 32-12-11, P. BLock 301).

2 Position access platforms at zone 147.

3 On APU section of panel 429VU, make certain that MASTER SW is in OFF position.

4 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

5 Disconnect connector 8QC-A from APU pump and connect terminals A and B to 115VAC voltmeter.

6 Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61

(b)Test

ACTION	RESULT
1. On ECAM control panel, press APU pushbutton switch.	- APU page appears on right ECAM display unit.
2. On APU section of panel 429VU - check that FUEL PUMP pushbutton switch 3QC is released (out).	In zone 147 - voltmeter indicates 0V.
3. Place MASTER SW in ON position	In zone 147 - voltmeter indicates 115V. On APU section of panel 429VU - OVRD legend comes on. - LO PR legend comes on. On R ECAM display unit - FUEL PUMP, LO PR and OVRD indications come on.
4. On overhead panel - pull APU FIRE handle 20WG.	In zone 147 - voltmeter indicates 0V. On APU section of panel 429VU - OVRD legend goes off. - LO PR legend goes off. On R ECAM display unit - FUEL PUMP, LO PR and OVRD indications go off.
5. On overhead panel - push APU FIRE handle 20WG and seal handle.	In zone 147 - voltmeter indicates 115V. On APU section of panel 429VU - OVRD legend comes on. - LO PR legend comes on. On R ECAM display unit - FUEL PUMP, LO PR and OVRD indications come on.
6. On APU section of panel 429VU - press FUEL PUMP pushbutton switch (AUTO Mode)	In zone 147 - voltmeter indicates 115V. On APU section of panel 429VU - OVRD legend goes off. - LO PR legend remains on. On R ECAM display unit - FUEL PUMP and LO PR indications remain on.

(c)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Disconnect voltmeter and connect connector 8QC-A to APU pump 8QC.

3 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
4 Remove access platforms.
5 Close left main gear door (Ref. 32-12-11, P. Block 301).
6 On APU section of panel 429VU, place MASTER SW in OFF position.
7 Close circuit breakers 1WF, 2WF.

C. Functional Test of APU Fuel Feed System Using one Tank Pump or APU Pump

(1)Reason for the job

(a)Functional test of APU fuel feed system

These tests are designed to ascertain that the fuel feed system is not obstructed.

NOTE : The tests described below are carried out using one left inner tank pump or the APU pump.

(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 6.5 m (21 ft. 5 in.)
(b)	Valve Equipped with a Flow Meter
(c)	Pressure Gage 0-3 bars (0 to 43.5 psi)
(d)	Blanking Plug/Cap APU Fuel Line
(e)97A28002098000	Blanking Cap Assembly
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-00-00, P. Block 301	Fuel
- 28-21-00, P. Block 501	Fuel Pump System
- 28-22-00, P. Block 301	Tank Isolation System
- 49-32-13, P. Block 401	APU Pump

(3)Procedure

(a)Job set-up

1 Position access platform 6.5 m (21 ft. 5 in.) under APU.
2 Open access doors 315AL and 316AR.
3 In APU compartment, disconnect APU fuel supply line.
4 Connect blanking cap assembly 97A28002098000 equipped with valve, flow meter and pressure gage to the end of line.
5 Make certain that left inner tank contains sufficient fuel to carry out the tests.
6 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
7 Make certain that ENG1 HP fuel shut off valve control lever is in OFF position (HP valve closed).
8 Open left inner tank isolation valve (Ref. 28-22-00, P. BLock 301).
9 Make certain that crossfeed valve is closed (flowbar on X-feed pushbutton switch crossline).
10 Open APU isolation valve.
11 Check that APU LP valve is open.

(b)Test of fuel feed system

1 with left inner tank pump2

- Start up inner tank pump2 (Ref. 28-21-00, P. Block 501).
- Open valve of blanking cap assembly installed on APU fuel supply line and regulate fuel flow rate to 6 liters per minute (1.58 US Gal per minute).
- When flow rate is stabilized at prescribed value, make certain that fuel pressure (read from pressure gage) is 2.5 ±0.1 bars (36.25 ±1.45 psi).
- As soon as test is completed, shut down the inner tank pump2 (Ref. 28-21-00, P. Block 501).
- Close valve of blanking cap assembly installed on APU fuel supply line.

2 with APU pump

- Start up APU pump (on panel 429VU place MASTER SW in ON position and select FUEL PUMP pushbutton switch in OVRD mode).
- Open valve installed on fuel supply line and regulate fuel flow rate to 6 liters per minute (1.58 US Gal per minute).
- When flow rate is stabilized at prescribed value, make certain that fuel pressure (read from pressure gage) is 1.3 ±0.1 bar (18.85 ±1.45 psi).
- As soon as test is completed shut down APU pump by means of MASTER SW on panel 429VU.
  Close valve installed on fuel supply line.

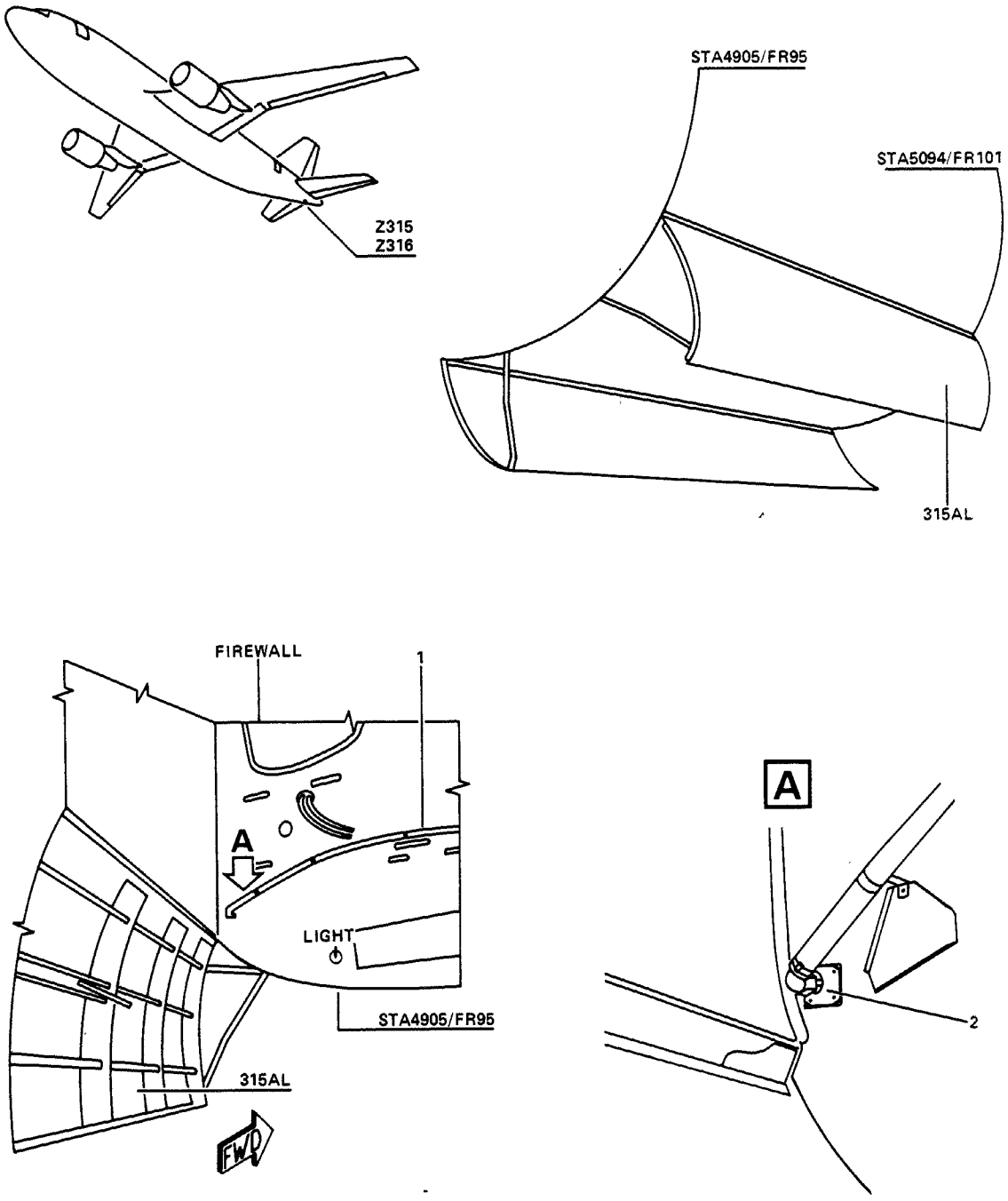
(c)Close-up

1 Disconnect valve from fuel supply line.
2 Connect fuel supply line to APU system.
3 Close left inner tank isolation valve (Ref. 28-22-00, P. Block 301).
4 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
5 Close access doors 315AL and 316AR.
6 Remove access platform.
7 De-energize the aircraft electrical network (Ref. 24-41-00,
8 Remove all ground handling and maintenance equipment, standard and special tools, together with ground power equipment, all access equipment and miscellaneous items.

D. Fuel Leakage Test
(1)Reason for the job
- fuel leakage test of APU fuel feed line.
(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 2.5 m (8 ft. 4 in.)
(b)	Access Platform 6.5 m (21 ft. 5 in.)
(c)	Fuel Pressurization Unit
(d)97A28002191000	Pressurization Equipment - APU Fuel Feed System
(e)	Blanking Cap - APU Fuel Line - Equipped with Pressure Gage 0-5 bars (0-72.5 psi) and Bleeder
Referenced Procedures	
- 24-41-00, P. Block 301	A/C External Power Control
- 28-00-00, P. Block 301	Fuel
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)
- 49-32-11, P. Block 401	Fuel Control Unit
- 49-32-13, P. Block 401	APU Pump

(3)Procedure
(Ref. Fig. 501)
NOTE : See alternate procedure if tooling is not available.
(a)Job set-up
1 Open left main landing gear door 734 (Ref. 32-12-11, P. Block 301).
2 Position access platform to gain access to doors 313AL, 315AL, 316AR and 734.
3 Remove APU pump (Ref. 49-32-13, P. Block 401).
4 Install APU fuel feed system pressurization equipment
R 97A28002191000 in lieu of APU pump.
R 5 In zone 147, connect fuel system pressurization unit to APU
R fuel feed system pressurization equipment 97A28002191000.
R NOTE : APU fuel-feed system pressurization equipment
R 97A28002191000 completely isolates APU fuel-feed system
R from crossfeed system.
R 6 In zone 315, disconnect APU fuel supply line (1).
R 7 On open line end (2), put a blanking cap equipped with pressure
R gage and bleeder.
R 8 Energize the aircraft electrical network (Ref. 24-41-00,
R P. Block 301).
(b)Test
WARNING : BEFORE BEGINNING THE TEST, MAKE CERTAIN THAT THE TEST EQUIPMENT IS FURNISHED WITH A SAFETY SYSTEM ENABLING THE ABSORPTION OF ANY POSSIBLE OVERPRESSURE WHICH MIGHT DAMAGE THE AIRCRAFT COMPONENT UNDER TEST.
WITH THE TEST EQUIPMENT INSTALLED, ISOLATE IT FROM THE AIRCRAFT COMPONENT AND PROCEED WITH A CALIBRATION CHECK OF THE SAFETY EQUIPMENT.



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APU Fuel supply Line
Figure 501

1 Make certain that APU FIRE handle 20WG is pushed (APU fuel feed system open).
On fuel section of panel 430VU, flowbar on APU/LP valves annunciator 6QF is ON.
2 On 429VU, place MASTER SW 14KD in ON position.
R 3 Using fuel system pressurization unit :
R a Purge APU fuel supply line through blanking cap equipped with
R bleeder.
R b On pressure gage, make sure that the pressure increases slowly
R in APU fuel supply line to 3,93 bars (57 psi).
R 4 Maintain pressure for 15 minutes.
NO LEAKAGE WHATSOEVER IS PERMITTED FROM THE SYSTEM.
R 5 Depressurize system.
R 6 On panel 429VU, place MASTER SW 14KD in OFF position.

(c)Close-up
1 De-energize the A/C electrical network (Ref. 24-41-00, P. Block 301).
2 In zone 315, disconnect blanking cap equipped with pressure gage and bleeder from APU fuel supply line (1).
Connect fuel supply line to APU.
R 3 In zone 147, disconnect fuel system pressurization unit from APU fuel feed system pressurization equipment.
R 4 Remove APU fuel feed system pressurization equipment.
R 5 Install APU pump (Ref. 49-32-13, P. Block 401).
R 6 Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
R 7 Close access door 313AL, 315AL and 316AR.
R 8 Remove access platforms.
R 9 Close main landing gear door (Ref. 32-12-11, P. Block 301).

(4)Alternate procedure
NOTE : This procedure can be used if tool 97A28002191000 is not available to perform a leak check of the APU fuel feed line.

(a)Job set-up
1 Purge the APU fuel feed line (Ref. 49-32-11, P. Block 401 (Para. F.)), to ensure that the APU will start and run normally.
2 Clean and dry the area around the previously repaired APU fuel feed line.

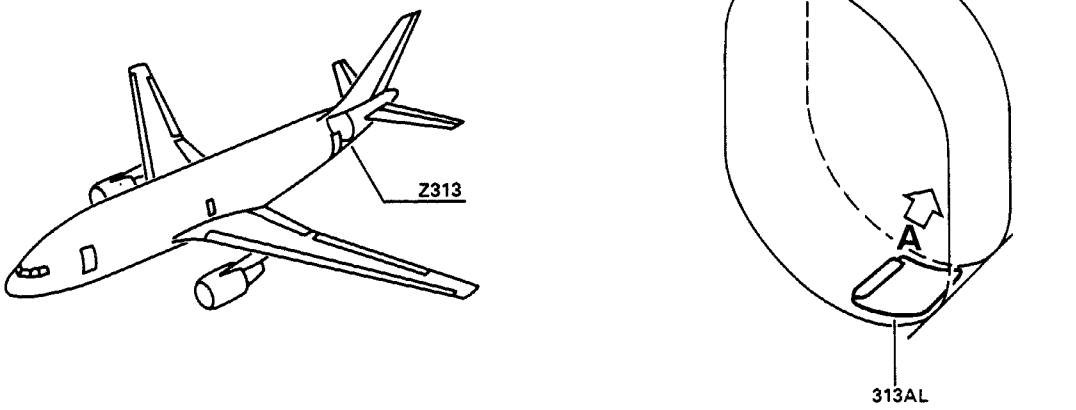
(b)Test
1 Pressurize APU fuel feed line using either an inboard boost pump, if sufficient fuel is in the inboard tank or the APU boost pump.
2 If no leakage is noted, start and run the APU for a minimum of 30 minutes.
3 Visually check for any fuel seepage at the area of the repair.
4 If no leakage is visible after 30 minutes, the test can be considered completed.
NOTE : NO LEAKAGE IS PERMITTED.
5 Shut down the APU.
6 Turn off the applicable fuel boost pump.

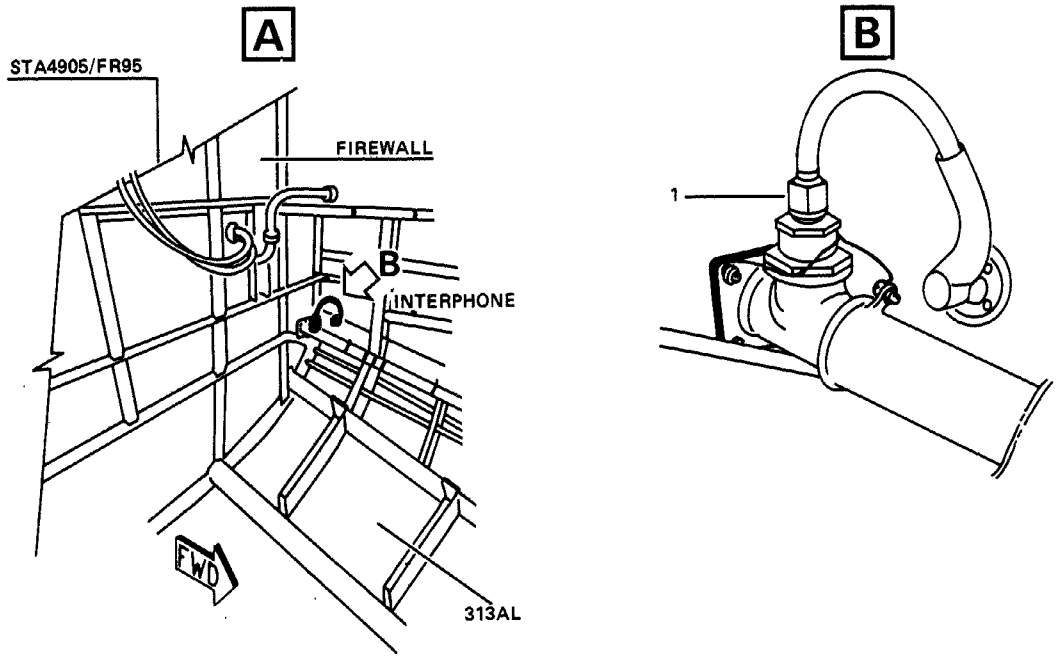
(c)Close-up
1 Close up the APU fuel shroud.

E. Air Leakage Test
(1)Reason for the job
- Air leakage test of APU fuel shrouded line.
(2)Equipment and materials

ITEM	DESIGNATION
(a)	Access Platform 2.5 m (8 ft. 4 in.)
(b)	Access Platform 6.5 m (21 ft. 5 in.)
(c)97A21102033000 or equivalent	Ground Pressurization Unit - Air
(d)	Blanking Cap Equipped with a Pressure Gage 0 - 5 bars (0 to 72.5 psi)
(e)	Blanking Cap
R Referenced Procedures	
R - 06-41-53, P. Block 1	Fuselage
R - 25-21-00, P. Block 401	Passenger Compartment/Seats
R - 25-28-11, P. Block 401	Carpet - Floor Covering
R - 25-28-12, P. Block 401	Covering - Non Textile Floor
R - 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)
R - 53-10-25, P. Block 401	Passenger Compartment Floor Panels

(3)Procedure
(a)Job set-up
1 Open left main landing gear door 734 (Ref. 32-12-11, P. Block 301).
2 Position access platform at zone 143.
3 Position access platform at zone 313, open access door 313AL.
(b)Test
WARNING : BEFORE BEGINNING THE TEST, MAKE CERTAIN THAT THE TEST EQUIPMENT IS FURNISHED WITH A SAFETY SYSTEM ENABLING THE ABSORPTION OF ANY POSSIBLE OVERPRESSURE WHICH MIGHT DAMAGE THE AIRCRAFT COMPONENT UNDER TEST.
WITH THE TEST EQUIPMENT INSTALLED, ISOLATE IT FROM THE AIRCRAFT COMPONENT AND PROCEED WITH A CALIBRATION CHECK OF THE SAFETY EQUIPMENT.
(Ref. Fig. 502)
R 1 Upstream of STA4905/FR95, on vent duct, disconnect ventilation air inlet line leading to outside of fuselage (zone 313).
R 2 Install a blanking cap assembly equipped with a pressure gage reading from 0 to 5 bars (0 to 72.5 psi) on vent duct outlet coupling (1).
(Ref. Fig. 503)
R 3 On left side of the passenger compartment, forward of FR47 :
R - remove relevant passenger compartment seats (Ref. 25-21-00, P. Block 401).
R - remove the floor covering (Ref. 25-28-11 and 25-28-12, P. Block 401).
R - remove the applicable floor panel (Ref. 06-41-53, P. Block 1 and 53-10-25, P. Block 401) to get access to the APU/trim tank fuel





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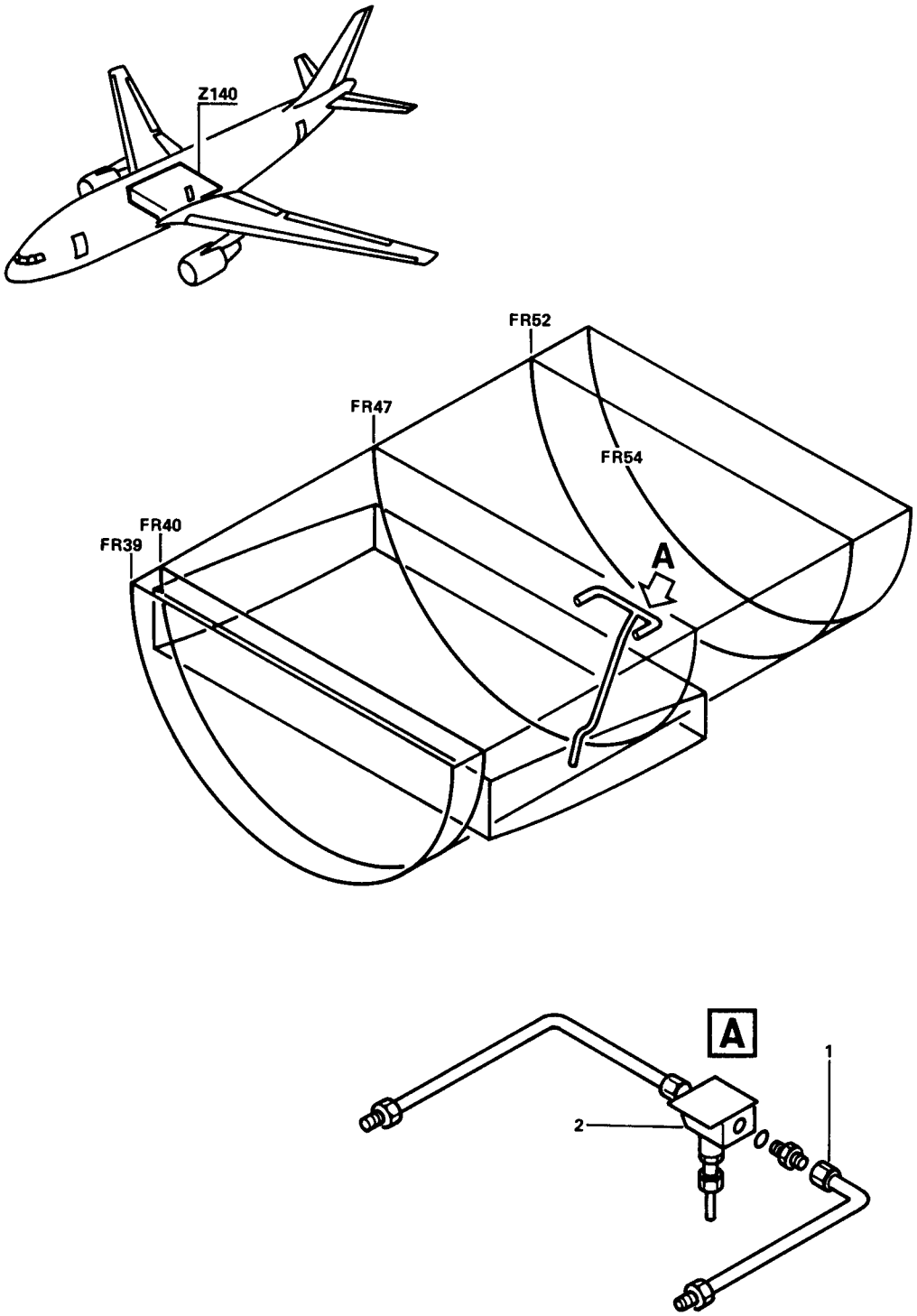
Vent Duct Outlet Coupling
Figure 502



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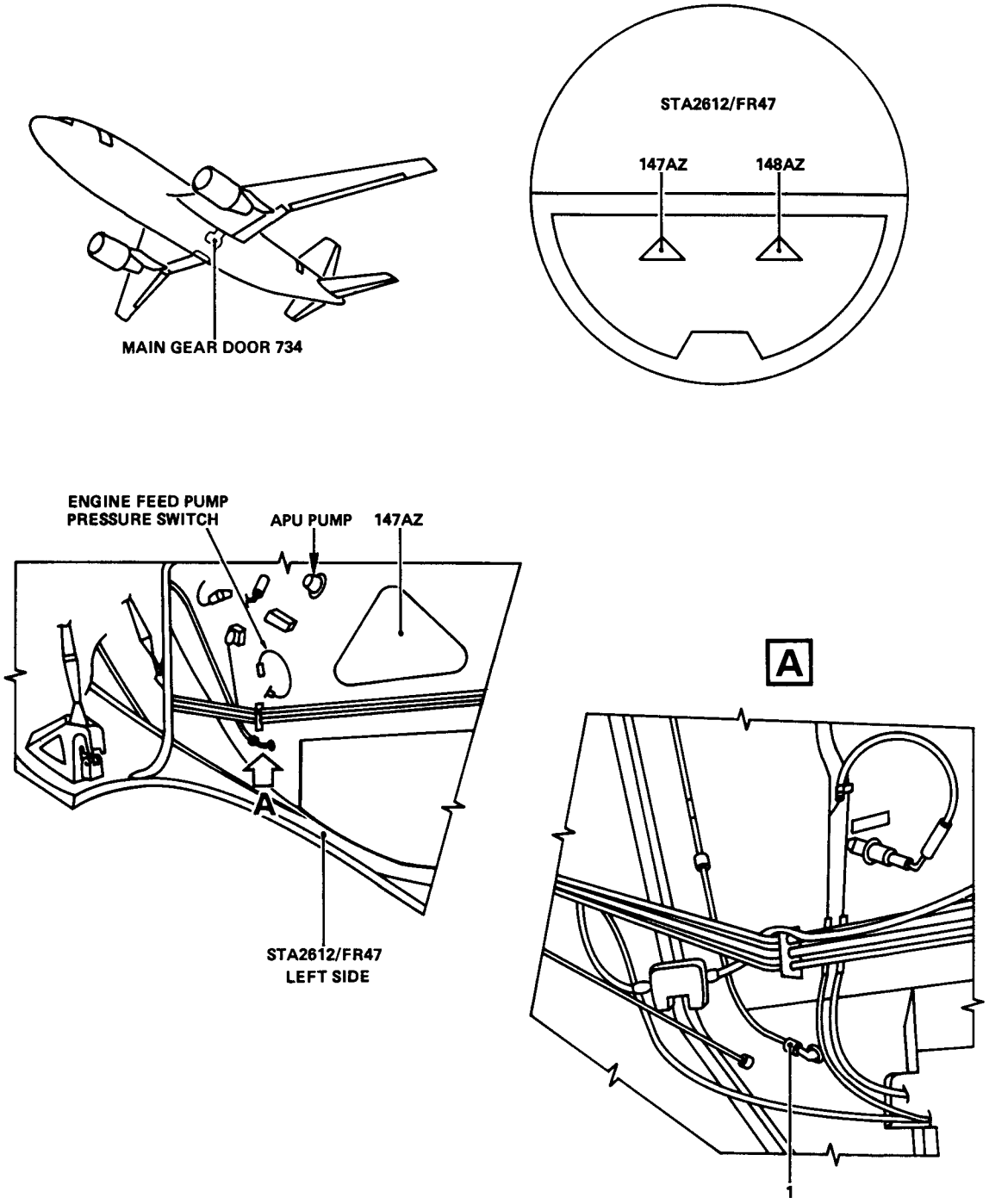
Trim Tank Transfer Drain Line
Figure 503

R vent ducts.
R NOTE : The tee (connecting the APU/trim-tank fuel-feed drain line)
R can now be seen.
R - Disconnect trim tank transfer drain line (1) from tee (2) and
R install a blanking cap on tee.
(Ref. Fig. 504)
R 4 In main landing gear compartment, frame 47 left side (looking Forward) disconnect drain line coming from APU fuel supply line at bulkhead union level (1).
R 5 Connect ground pressurization unit to portion of drain line leading to vent duct.
R 6 Using ground pressurization unit, slowly pressurize system to 1.5 bars (22 psig). Maintain pressure for 15 minutes.
NO LEAKAGE WHATSOEVER IS PERMITTED FROM THE SYSTEM.
R 7 Depressurize system.
(c) Close-up
R 1 In zone 313, remove blanking cap assembly and pressure gage from vent duct air outlet coupling.
Connect ventilation air inlet line to vent duct.
R 2 In zone 143, remove blanking cap from tee and connect the tank transfer drain line onto tee.
R 3 In zone 143, disconnect air ground pressurization unit and connect drain line.
R 4 Make sure that the work area is clean and clear of tools and other
R items of equipment and install the applicable floor panel
R (Ref. 06-41-53, P. Block 1 and 53-10-25, P. Block 401).
R 5 Install the floor covering (Ref. 25-28-11 and/or 25-28-12,
R P. Block 401).
R 6 Install relevant passenger compartment seats (Ref. 25-21-00,
R P. Block 401).
R 7 Close access door 313AL.
R 8 Remove access platforms.
R 9 Close main landing gear door (Ref. 32-12-11, P. Block 301).
R 10 Make certain that working area is clean and clear or tools and miscellaneous items of equipment.



APU Fuel Supply Drain Line
Figure 504

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

CHECK THAT THE LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

BEFORE AND DURING MAINTENANCE OPERATIONS TO BE UNDERTAKEN INSIDE A FUEL TANK, THE PRESCRIBED SAFETY PRECAUTIONS MUST BE RIGOROUSLY OBSERVED (REF. 28-00-00, P. BLOCK 301).

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Reason for the Job

A. To check the APU fuel feed system for leakage.

R NOTE : The permitted damage limits for the fuel pipes and the fuel line
R shrouds are contained in the Fuel Pipe Repair Manual.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 2 m (6 ft. 7 in.)
Referenced Procedure	
- 28-00-00, P. Block 301	Fuel
- 49-31-00, P. Block 501	Fuel Distribution

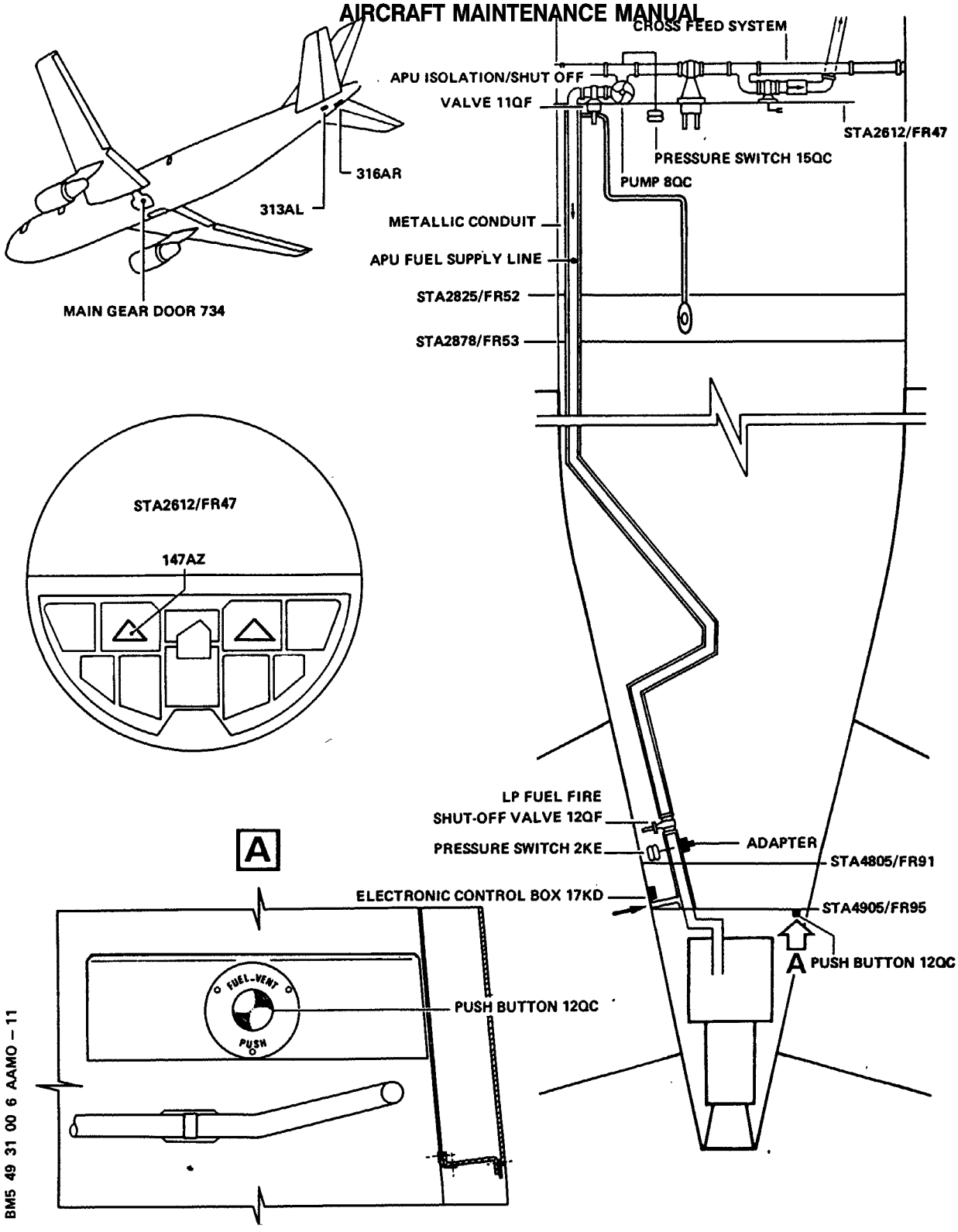
3. Procedure
(Ref. Fig. 601)

A. Job Set-Up
- Position access platform beneath the fuselage, at the ventilation duct of the APU fuel feed system drain between STA2825 (FR52) and STA2878 (FR53).

B. Procedure
To check condition of fuel drain and fuel feed system for leakage.
(1)Make certain that no foreign bodies obstruct the drain orifice.
(2)Make certain, by a visual check, that there is no fuel leakage from the APU fuel feed system drain.
CAUTION : NO LEAKAGE WHATSOEVER IS PERMITTED FROM THE APU FUEL FEED SYSTEM.

C. Permissible Damage on APU Fuel Feed System Ventilation Duct
(1)In case of ventilation duct distortion on the upper or lateral face resulting from a blow or excessive compression, the permissible depth of dent is 5 mm (0.196 in.) (half of the gap between duct and inner fuel line).
(2)In the event of distortion, make certain that dent is free from sharp edges so as to avoid brittleness and breaking of material.
(3)Check for cracks.
(4)Check for dents at the lower part of duct or in areas difficult to reach.
(5)If duct shows several distorted areas, with one distortion reaching the maximum permissible depth, perform a duct leakage test (Ref. 49-31-00, P. Block 501).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.



APU Fuel Feed System - Component Location
Figure 601

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
R WARNING : FUEL LEAKS ARE A FIRE-HAZARD. SHUT DOWN APU IMMEDIATELY
R IF FUEL LEAKAGE OCCURS. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS
R AVAILABLE.
R CAUTION : MAKE CERTAIN THAT LOCATION PINS ARE ALIGNED WITH LOCATION SLOTS
R WHEN POSITIONING FUEL NOZZLES (11).
R CAUTION : MAKE CERTAIN THAT ALL VALVES ON FUEL MANIFOLD TESTER
R ARE IN THE CORRECT POSITION BEFORE APPLYING PRESSURE.
R NOTE : The following procedure is also applicable for the secondary fuel
R manifold and nozzles.

1. Removal/Installation

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
R (3)	Torque Wrench, up to 1.7 m.daN (12.5 lbf.ft.)
(4)	Circuit Breaker Safety Clips and Tags
(5)	Container, 2 l (0.52 US gal.) Capacity
(6)	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.020 in.) Dia.
(7)Material No. 04-014	Common Greases (Ref. 20-31-00)
R (8)289544-1	Tester - Fuel Manifold
R or	
R 289544-6	Tester - Fuel Manifold
R or	
R 833563-6	Tester - Fuel Manifold
R (9)291800-7	Orifice - Primary
R or	
R 291800-8	Orifice - Secondary
Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

B. Procedure

(1)Job Set-Up

(a)Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

(c)Position access platform and open access doors 315AL and 316AR.

R (d)Put container in position to catch residual fuel.

(2)Removal

R (Ref. Fig. 201)

NOTE : Install blanking caps or plugs to disconnected lines.

(a)Disconnect fuel supply line (9) at manifold (8) and drain residual fuel into container.

(b)Disconnect and remove fuel manifold (8) from the six fuel nozzles (5) at conections (3).

(c)Cut and remove lockwire from bolts (1).

(d)Remove bolts (1), retainers (4) and if fitted spacer (2).

NOTE : Note location of spacer for installation.

(e)Remove fuel nozzles (5), shrouds (6) and gaskets (7).

(f)Discard gaskets (7).

(g)Remove container.

(3)Preparation for Installation

(a)Inspect manifold (2), nozzles (5), shrouds (6), retainers (4) and if removed, spacer (2) for damage, replace if necessary.

(b)Inspect APU fuel nozzle ports for cracks and security of attachment nuts.

(4)Installation

CAUTION : MAKE CERTAIN THAT LOCATION PINS ARE ALIGNED WITH LOCATION SLOTS WHEN POSITIONING FUEL NOZZLES.

NOTE : Remove blanking caps or plugs from lines.

(a)Apply a thin coating of grease (Mat. No.04-014) to bolts (1).

(b)Install new gaskets (7) on shrouds (6).

(c)Position fuel nozzles (5) in shrouds (6).

(d)Put fuel nozzles (5) with shrouds (6) into APU fuel nozzle ports and install with retainers (4) and if removed, spacer (2) and bolts (1).

(e)TORQUE bolts (1) to between 0.68 and 0.71 m.daN (60 and 63 lbf. in.).

(f)Safety bolts (1) with lockwire.

(g)Attach manifold (8) to the six fuel nozzles (5).

(h)TORQUE manifold unions (3) to between 0.85 and 0.90 m.daN (75 and 80 lbf. in.).

(j)Connect fuel supply line (9) to manifold (8).

(k)TORQUE manifold union (8) to between 1.36 and 1.53 m. daN (120 and 135 lbf.in.).

(l)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD, 10QC, 11QC 1QF and 71KD.

(5)Test

WARNING : FUEL LEAKS ARE A FIRE-HAZARD. SHUT DOWN APU IMMEDIATELY IF FUEL LEAKAGE OCCURS. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

(a)Start and operate APU with no load (Ref. 49-10-00, P. Block 501).

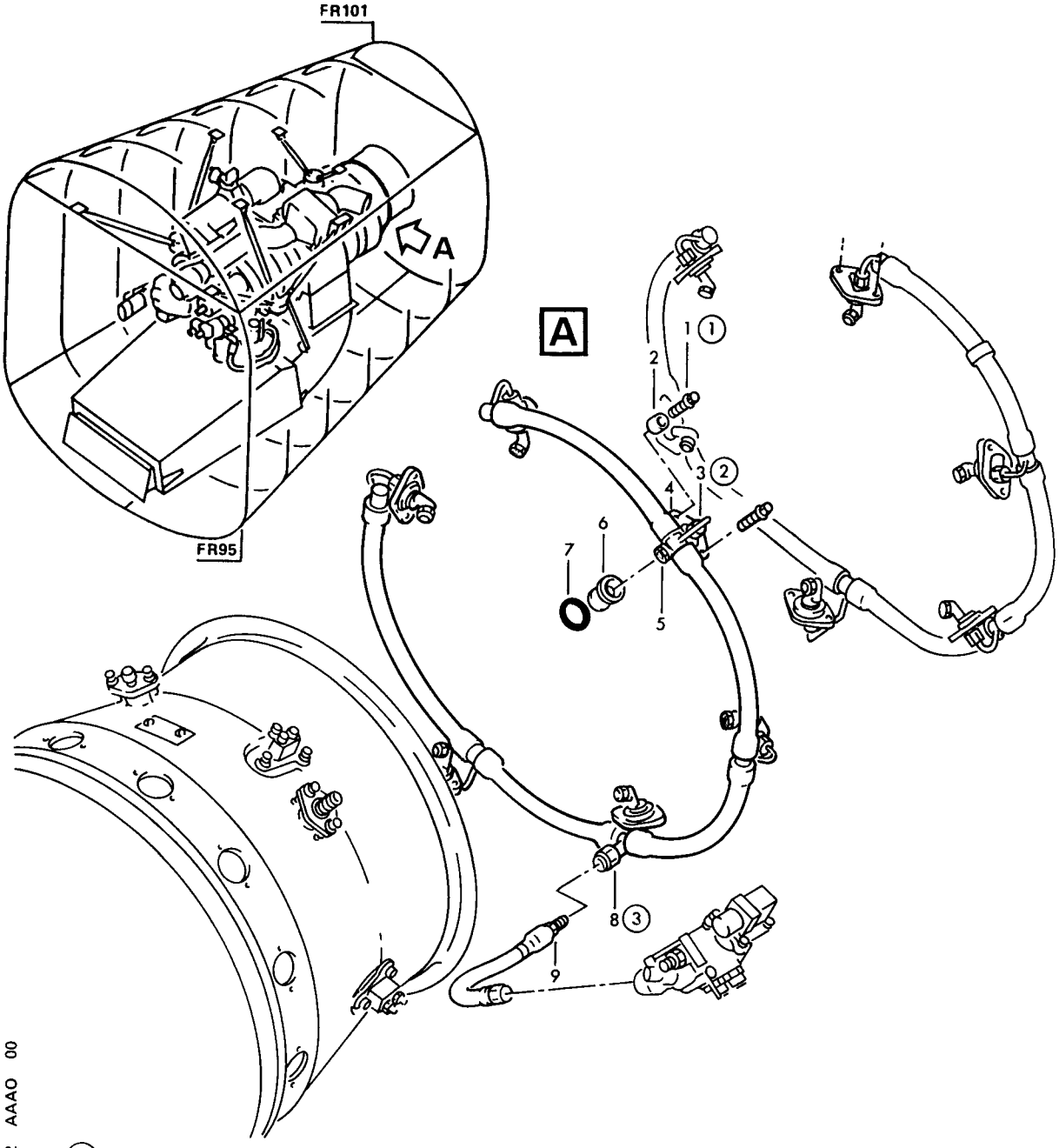
1 Check fuel supply line, and manifold unions for leakage.

(b)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Close access doors 315AL and 316AR and remove access platform.



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(1) TORQUE TO BETWEEN 0.68 AND 0.71 m. daN (60 AND 63 lbf. in.)
(2) TORQUE TO BETWEEN 0.85 AND 0.90 m. daN (75 AND 80 lbf. in.)
(3) TORQUE TO BETWEEN 1.36 AND 1.53 m. daN (120 AND 135 lbf. in.)

Fuel Manifolds and Nozzles
Figure 201

R

2. Functional/Test

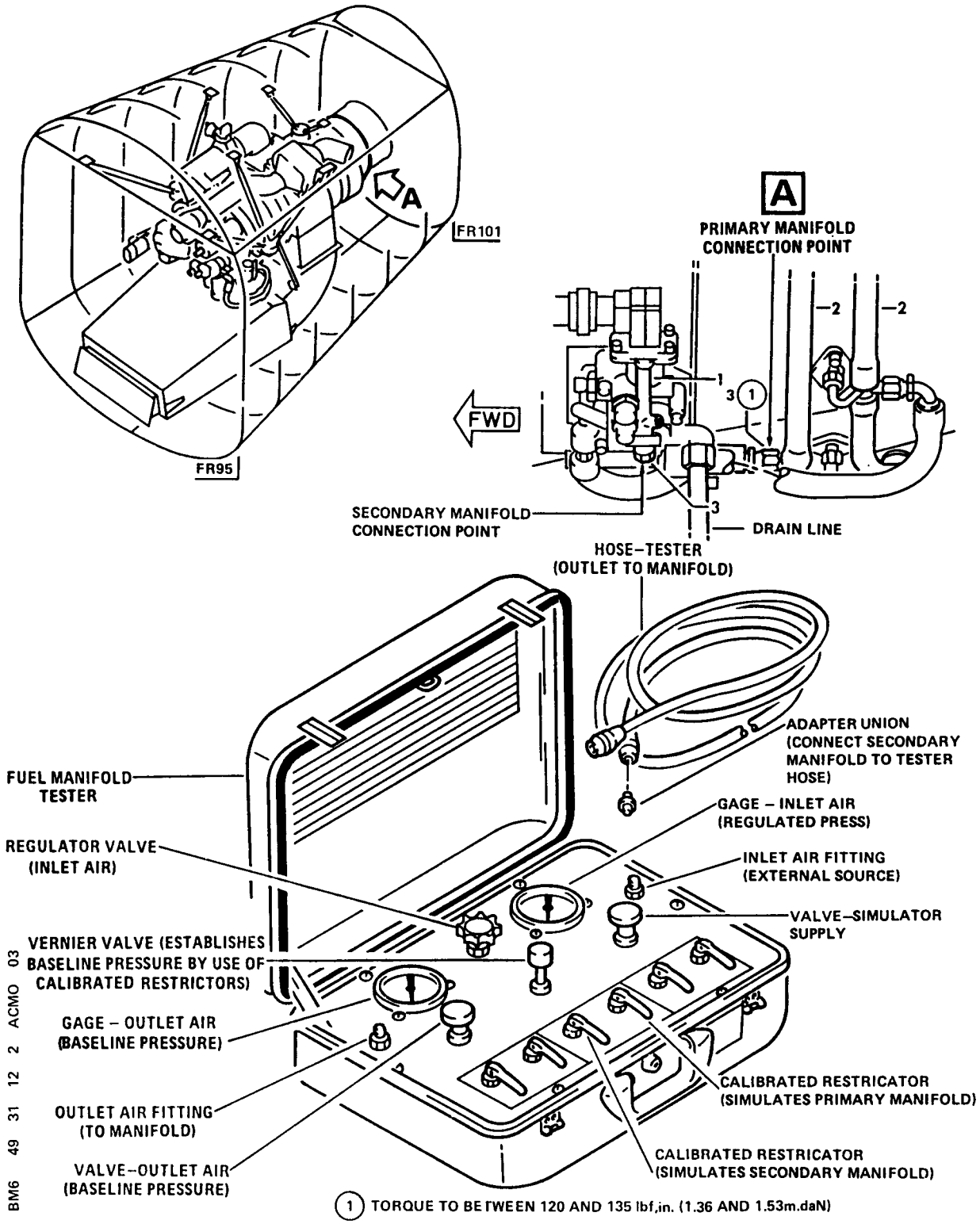
Referenced Procedure
- 49-10-00, P. Block 501 Power Plant

R A. Procedure
(1)Job Set-Up
R (Ref. Fig. 202)
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

R (b)Position access platform and open access doors 315AL and 316AR.
R (c)Put container in position to catch residual fuel.
R (d)Disconnect fuel supply line (9) from fuel manifold (8) and
R drain residual fuel.
R (e)Install blanking cap or plug to disconnected fuel supply line (9).

(2)Test
(Ref. Fig. 202)
(a)Connect fuel manifold tester.
R CAUTION : MAKE CERTAIN THAT ALL VALVES ON FUEL MANIFOLD TESTER ARE
R IN THE CORRECT POSITIONS BEFORE APPLYING PRESSURE.
R 1 Connect a source of high pressure, filtered, nitrogen or
R dry air to the tester.
R 2 Regulate the pressure of nitrogen or air to between 160 and 170 psig.
(11.03 and 11.72 bar).
R 3 Remove blank from tester hose and connect to fuel manifold (8).
R 4 Pressurize tester.
(b)Operate fuel manifold tester.
1 Adjust inlet pressure on tester to 150 psig. ± 1 psig.
(10.34 bar ± 0.07 bar).
R 2 Select and activate the appropriate calibrated restrictor valve
R to simulate a new nozzle and manifold assembly.
R 3 Operate the tester vernier valve and adjust the baseline pressure
R flow to 100 psig. (6.9 bar) to simulate a new nozzle and
R manifold assembly.
4 De-activate the selected calibrated restrictor valve.
5 Pressurize the nozzle and manifold assembly.
6 Read pressure indication on tester outlet pressure gage
(Ref. Table 201).


FR101
A
FR95
A
PRIMARY MANIFOLD CONNECTION POINT
FWD
SECONDARY MANIFOLD CONNECTION POINT
DRAIN LINE
HOSE–TESTER (OUTLET TO MANIFOLD)
ADAPTER UNION (CONNECT SECONDARY MANIFOLD TO TESTER HOSE)
FUEL MANIFOLD TESTER
GAGE – INLET AIR (REGULATED PRESS)
REGULATOR VALVE (INLET AIR)
INLET AIR FITTING (EXTERNAL SOURCE)
VALVE–SIMULATOR SUPPLY
VERNIER VALVE (ESTABLISHES BASELINE PRESSURE BY USE OF CALIBRATED RESTRICTORS)
GAGE – OUTLET AIR (BASELINE PRESSURE)
CALIBRATED RESTRICATOR (SIMULATES PRIMARY MANIFOLD)
OUTLET AIR FITTING (TO MANIFOLD)
CALIBRATED RESTRICATOR (SIMULATES SECONDARY MANIFOLD)
VALVE–OUTLET AIR (BASELINE PRESSURE)
1 TORQUE TO BETWEEN 120 AND 135 lbf.in. (1.36 AND 1.53m.daN)
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Pneumatic Pressure Flow Test of Fuel Manifolds
Figure 202

R

OBSERVED PRESSURE (psig.)	COMMENTS/ACTION
131 and over	Nozzles are plugged, remove and replace. (Ref. para. 1.)
111 to 130	Possible nozzle plugging, monitor and recheck in 500 hours.
100 to 110	Production nozzle and manifold assembly tolerance range.
99 and under	Check for leaks.

NOTE : It is permissible to replace an individual nozzle without fuel flow
R checking of the nozzle and manifold assembly, if the reason for
R replacement was fuel leakage or external damage and not contamination or flow restriction problems.

Table 201

7 Depressurize tester.

CAUTION : MAKE CERTAIN THAT ALL VALVES ON FUEL MANIFOLD TESTER ARE IN
R THE CORRECT POSITIONS AND TEST GAS SUPPLY IS INTERRUPTED
R BEFORE DISCONNECTING HOSE.

R (c)Disconnect tester hose from fuel manifold (8) and install blank.
R (d)Remove blanking cap or plug and connect fuel supply line (9) to manifold (8).
R (e)TORQUE manifold union (8) to between 1.36 m.daN and 1.53 m.daN. (120 lbf.in. and 135 lbf. in.).
R (f)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD, 10QC, 11QC, 1QF and 71KD.
R (g)Leak Test

WARNING : FUEL LEAKS ARE A FIRE-HAZARD. SHUT DOWN APU IMMEDIATELY
R IF FUEL LEAKAGE OCCURS. MAKE CERTAIN THAT FIRE FIGHTING
R EQUIPMENT IS AVAILABLE.

1 Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
2 Check fuel connections for leakage.
3 Shut down APU (Ref. 49-10-00, P. Block 501).

(3)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

The maintenance practices for secondary fuel manifold and nozzle are identical to the maintenance practices of primary fuel manifold and nozzle (Ref. 49-31-12, P. Block 201).

FUEL FILTER - SERVICING

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : CARRY OUT CLEANING IN A WELL VENTILATED AREA. PROTECTIVE GOGGLES, GLOVES AND CLOTHING SHOULD BE WORN. MAKE CERTAIN THAT ADEQUATE FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORKING AREA.

WARNING : SHUT DOWN APU IMMEDIATELY IF A FUEL LEAK IS OBSERVED. MAKE CERTAIN, THAT FIRE FIGHTING EQUIPMENT IS ADEQUATE AND AVAILABLE.

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1. Reason for the Job

A. Check of Inlet Fuel Filter Differential Pressure Indicator (Pop-out not protruding)

B. Replacement of Fuel Inlet Filter and replacement and cleaning of High Pressure Fuel Filter

2. Check of Inlet Fuel Filter Differential Pressure Indicator (Pop-out not protruding)

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags

B. Procedure

(1)Job Set-Up

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(a)Make certain that the Master switch controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(b)Open, safety and tag the following circuit breakers:

	PANEL	SERVICE	IDENT.	LOCATION
	131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
	131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
	131VU	APU/ECB BACK UP/CTL	71KD	B53
	131VU	APU/START	50KA	B54
	131VU	APU/ECB SUPPLY/MAIN	1KD	B57
R	131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

(c)Position access platform and open access doors 315AL and 316AR.

(2)Check of Inlet Fuel-Filter Differential Pressure Indicator
(a)Examine the fuel-filter differential pressure indicator. The indicator pin must not protrude from its housing.
(b)If the indicator pin protrudes from its housing, you must replace the fuel filter element (see below).
(3)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.
(c)Remove safety clips, tags and close circuit breakers 50KA, 1KD, 10QC, 11QC, 71KD and 1QF.

3. Replacement of Fuel Inlet Filter and replacement and cleaning of High Pressure Fuel Filter

A. Equipment and Materials

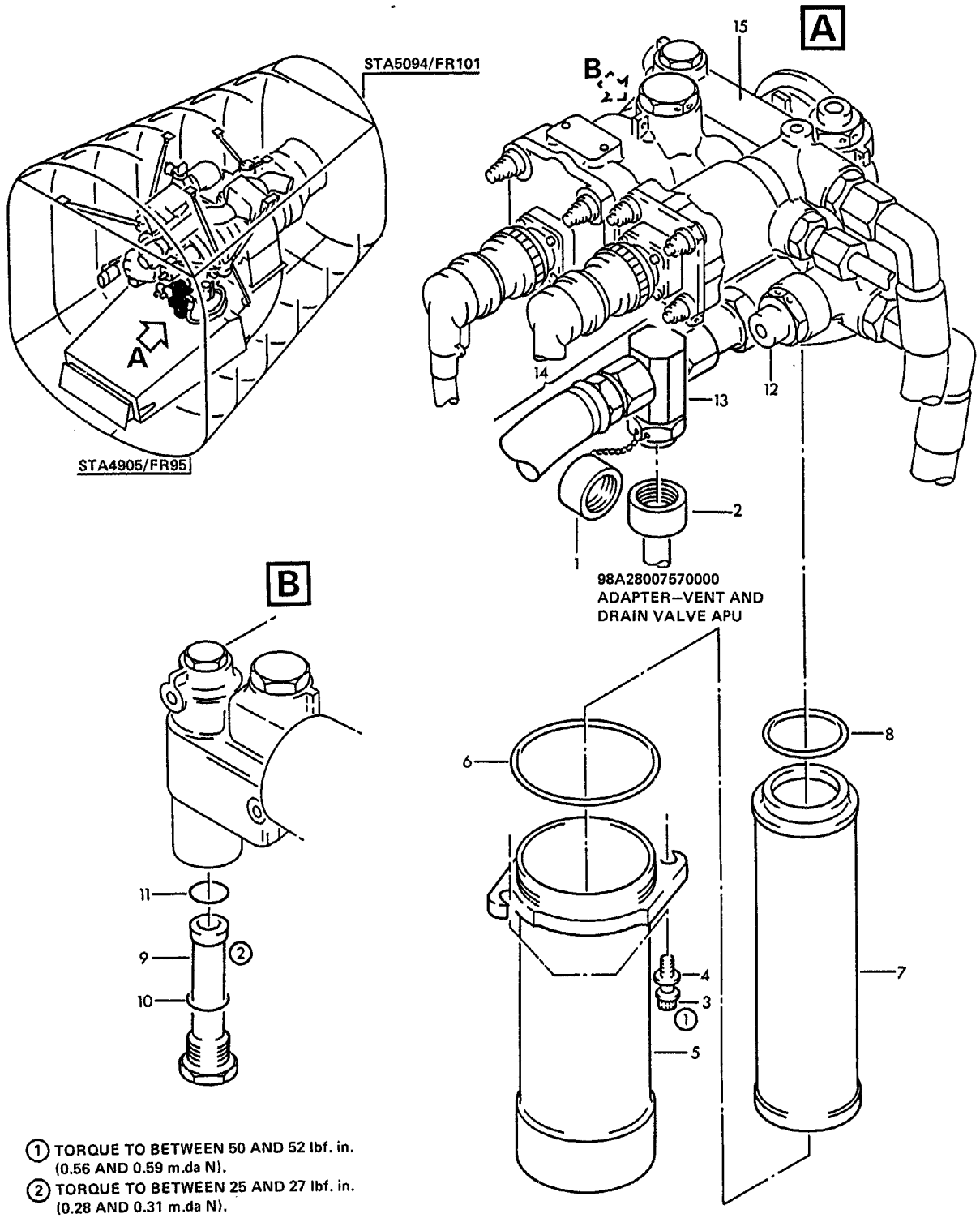
ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.020 in.) dia.
(4)	O-Rings
(5)	Container, 2.0 l (0.52 US Gal.) Capacity
(6)	Torque Wrench, 0-1 m.daN (0-88.5 lbf.in.)
(7) 98A28007570000	Adapter-Vent and Drain Valve, APU
(8) Material No. 01-002	Fuels (Ref. 20-31-00)
or	
(9) Material No. 01-003	Fuels (Ref. 20-31-00)
(10) Material No. 04-505	Common Greases (Ref. Consumable Material List, Part 2)

Referenced Procedure
- 49-10-00, P. Block 501 Power Plant

B. Procedure
(Ref. Fig. 301)

(1)Job Set-Up
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.
(a)Make certain that the Master switch controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(b)Open, safety and tag the following circuit breakers:



Fuel Filter
Figure 301

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

(c)Position access platform and open access doors 315AL and 316AR.
(d)Drain fuel feed line assy (14), using vent and drain valve adapter.
1 Position container, 2.0 l (0. 53 US gal) capacity, below fuel feed line vent and drain valve port (13).
2 Direct drain hose of vent and drain valve adapter (2) into container.
3 Remove cap (1) from fuel feed line vent and drain valve port.
4 Install vent and drain valve adapter (2) to fuel feed line vent and drain valve port (13).
5 After draining remove vent and drain valve adapter (2) from fuel feed line vent and drain valve port (13).
6 Install cap (1) to fuel feed line vent and drain valve port (13).

(2)Removal
(a)Remove fuel inlet filter.
1 Release bolts (3), disengage and remove filter housing (5), and empty fuel into container.
2 Remove and discard filter element (7) and O-rings (6, 8) out of filter housing (5).
3 Remove bolts (3) and washers (4).
(b)Remove high pressure fuel filter.
1 Cut and remove lockwire, remove high pressure fuel filter (9).
2 Remove and discard O-rings (10, 11).

(3)Preparation for Installation
(a)Clean high pressure fuel filter (9) and fuel inlet filter housing (5).
WARNING : CARRY OUT CLEANING IN A WELL VENTILATED AREA.
PROTECTIVE GOGGLES, GLOVES AND CLOTHING SHOULD BE WORN.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE, ADEQUATE AND IN PROXIMITY TO THE WORKING AREA.
1 Clean high pressure fuel filter with fuel (Mat. No. 01-002 or Mat. No. 01-003), using a soft brush.
2 Dry high pressure fuel filter with compressed air.
3 Clean fuel inlet filter housing (5) with fuel (Mat. No. 01-002 or Mat. No. 01-003), using a soft brush.
4)Dry fuel inlet filter housing (5) with compressed air.
(b)Inspect high pressure fuel filter (9).
1 Inspect filter wire mesh for holes or cuts.
2 Inspect filter mounts for nicks, dents, or cracks.
3 Replace filter, if necessary.

(c)Inspect fuel inlet filter housing.
1 Inspect filter housing (5) for damage.
2 Inspect threads and washers (4) of bolts (3) for damage.
3 Replace housing, bolts or washers, if necessary.
4 Position bolts (3) and washers (4) to fuel control unit (15).

(4)Installation
(a)Install fuel inlet filter.
1 Apply grease (Mat. No. 04-505) to new O-rings (6, 8).
2 Fit new O-rings (6, 8) and position new filter element (7) and filter housing (5).
3 TORQUE bolts (3) to between 50 and 52 lbf.in. (0.56 and 0.59 m.daN).
4 Reset differential pressure indicator (12), if necessary.
(b)Install high pressure fuel filter.
1 Apply grease (Mat. No. 04-505) to new O-rings (10, 11).
2 Fit new O-rings (10, 11).
3 Install high pressure filter (9).
4 TORQUE high pressure filter (9) to between 25 and 27 lbf.in. (0.28 and 0.31 m.daN).
5 Safety high pressure filter (9) with Lockwire.
(c)Remove container.

(5)Test
(a)Remove safety clips, tags and close circuit breakers 50KA, 1KD, 10QC, 11QC, 71KD and 1QF.
WARNING : SHUT DOWN APU IMMEDIATELY IF A FUEL LEAK IS OBSERVED MAKE CERTAIN, THAT FIRE FIGHTING EQUIPMENT IS ADEQUATE AND AVAILABLE.
(b)Start and operate APU (Ref. 49-10-00, P. Block 501).
NOTE : More than one start attempt may be required to achieve initial light off.
(c)Check fuel filters and fuel line connections for leakage.
NOTE : Leakage is not permissible.
(d)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

APU FUEL FEED LINE - REMOVAL/INSTALLATION

WARNING : LANDING GEAR - MAKE CERTAIN THAT GROUND SAFETIES AND CHOCKS ARE IN POSITION.
FLIGHT CONTROLS - MAKE CERTAIN THAT GROUND SAFETIES AND NOTICES ARE IN POSITION.
OBSERVE SAFETY PRECAUTIONS IN 28-00-00, P. BLOCK 301.
BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
BEFORE PRESSURIZING FUEL SYSTEMS, MAKE CERTAIN THAT FUEL SYSTEM HAS BEEN ISOLATED.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

1. Equipment and Materials

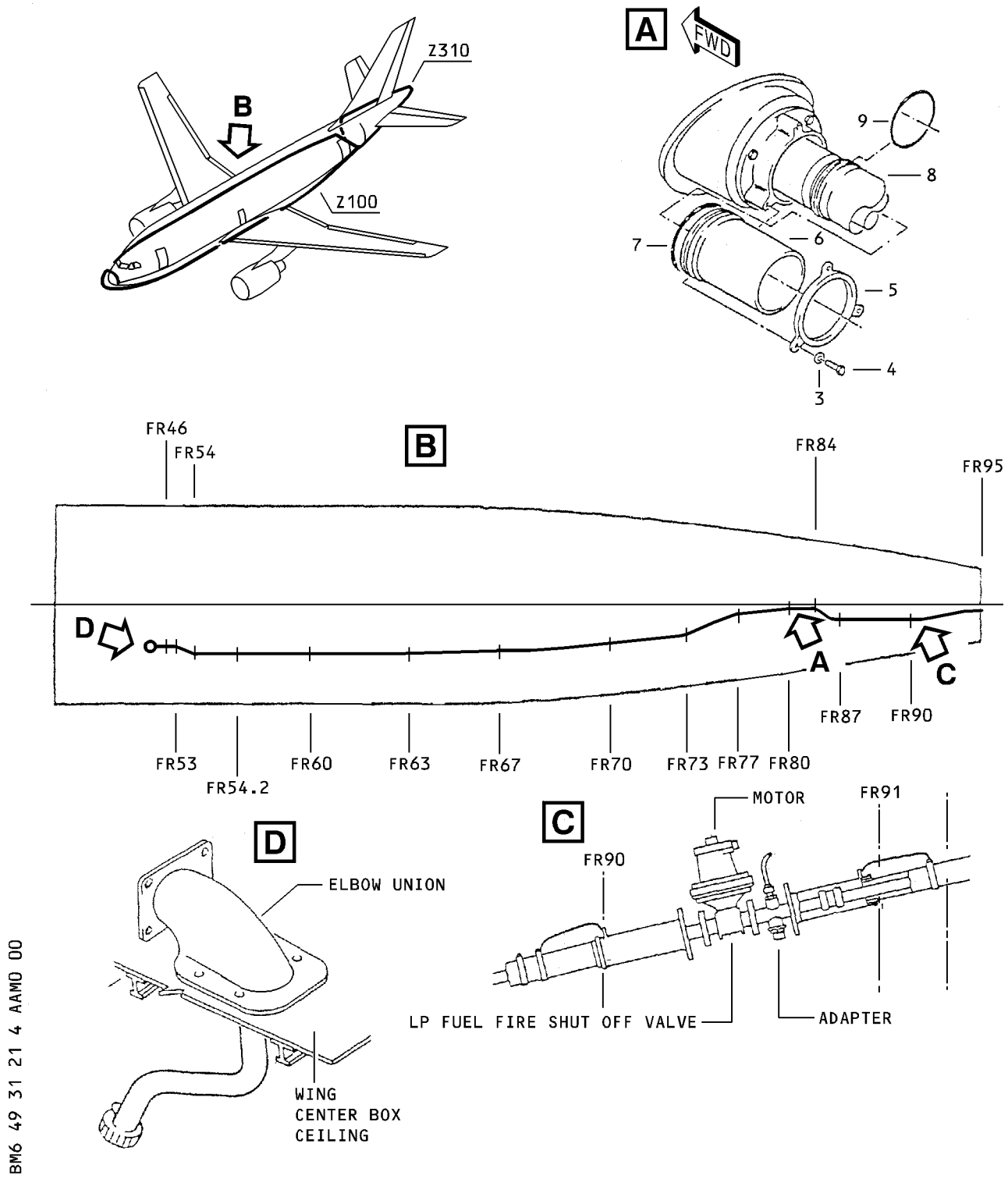
ITEM	DESIGNATION
A.	Access Platform, up to 5.5 m (18 ft.)
B.	Blanking Caps
C.	Circuit Breaker Safety Clips
D.	Container 5 l (1.3 US gal.) Capacity
E.	O-Rings
F. Material No. 04-012	Common Greases (Ref. 20-31-00)
G. Material No. 19-018	Miscellaneous (Ref. 20-31-00)
Referenced Procedures	
- 20-28-11, P. Block 1	Electrical Bonding
- 25-55-10, P. Block 201	AFT Cago Compartment - Linings
- 49-10-00, P. Block 401	Disconnect the Fuel Feed Line
- 49-31-00, P. Block 501	APU Fuel Feed System
- 49-32-11, P. Block 401	Draining of Fuel Feed Line
- 49-33-11, P. Block 401	APU Isolation Valve
- 49-33-12, P. Block 401	Low Pressure Valve
- 52-30-00, P. Block 301	FWD and AFT Cargo Compartment Doors
- 53-10-25, P. Block 401	Passenger Compartment Floor Panels

2. Procedure

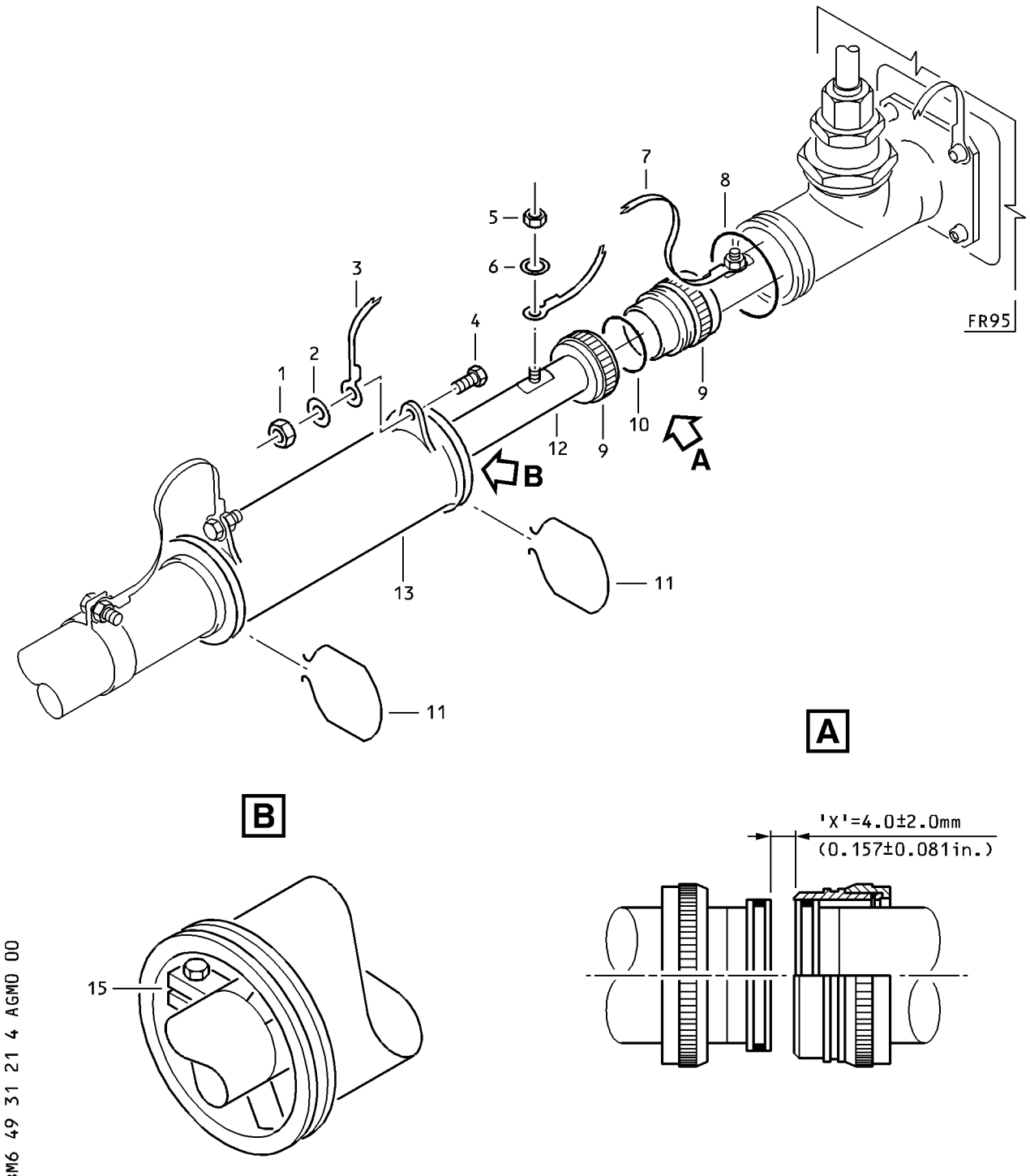
A. Job Set-Up
(1)Position access platform.
(2)Open AFT cargo compartment door 812, and secure with safety lock (Ref. 52-30-00, P. Block 301).
(3)Open BULK cargo compartment door 813.
(4)Open the APU access doors 312AR and 313AL.
(5)Remove the left-hand side cargo compartment sidewall panels, 151FW, 151HW, 151KW, 151NW, 151QW, 161BW, 161DW, 161JW and 161MW (Ref. 25-55-10, P. Block 201).
(6)Remove the passenger compartment floor panels (Ref. 53-10-25, P. Block 401).
(7)Drain the APU fuel feed line (Ref. 49-32-11, P. Block 401).
(8)Make certain that the APU master SW controlling the APU pump and the isolation (shut off) valve is in the OFF position.
(9)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/FUEL/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/FUEL/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

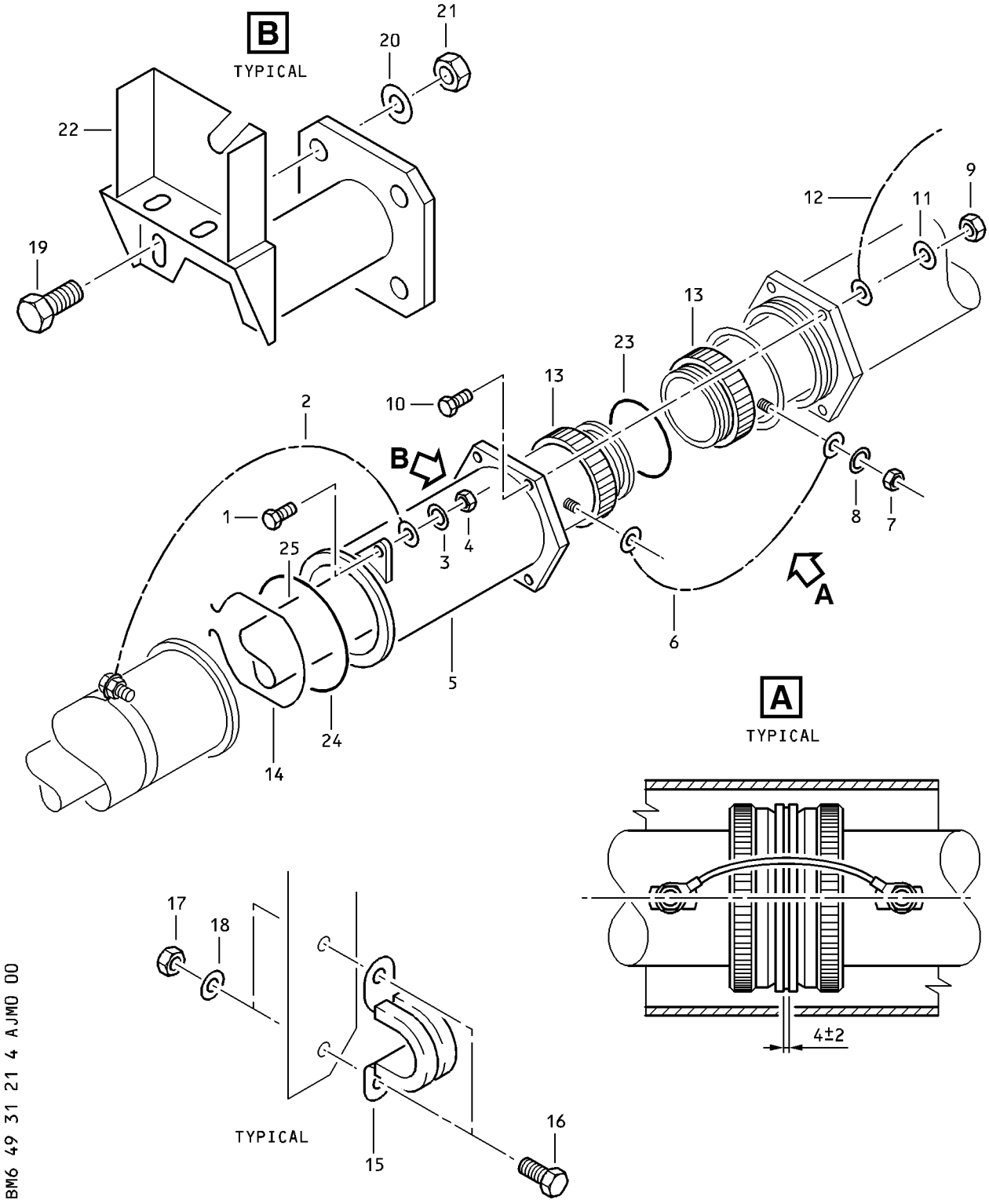
B. Removal
(Ref. Fig. 401)
(Ref. Fig. 402)
(Ref. Fig. 403)
(1)Disconnect the APU fuel feed line from the APU. (Ref. 49-10-00, P. Block 401).
(2)Remove the shrouded fuel feed line from the supports (Typical) (Ref. Fig. 403).
(a)Remove the nuts (21), the washers (20) and the bolts (19).
(b)Remove the shrouded fuel feed line from the support (22).
(3)Remove the shrouded fuel feed line clamps (Typical) (Ref. Fig. 403).
(a)Remove the nuts (17), the washers (18) and the bolts (16).
(b)Remove the clamp (15) from the bracket.
(4)Remove the APU fuel feed line between the adapter and the APU fire shut off valve (Ref. Fig. 402).
(a)At the adapter (Typical).
1 Remove the nut (1), the washer (2), the bolt (4) and bonding strip (3) from the coupling sleeve (13).
2 Cut and discard the locking wire of the spring clips (11).
3 Remove the spring clips (11).
4 Slide the coupling sleeve (13) forward.
5 Remove the nut (5), the washer (6) and the bonding strip (7) from fuel feed line (12).



APU Fuel Feed System
Figure 401



Shrouded Fuel Feed Line at FR95 (Typical)
Figure 402



Shrouded Fuel Feed Line at FR84 (Typical)
Figure 403

6 Cut and discard the locking wire.
7 Loosen the nuts (9) of the fuel feed line (12) and keep the connector.

(b)At the fire shut off valve.
(Ref. 49-33-12, P. Block 401).
(c)Position the container.
(d)Remove the feed fuel line (12).
(e)Remove and discard the o-rings (8) and (10) and install the blanking caps on the ends of all the fuel lines.

(5)Remove the fuel feed line between the fire shut off valve and the bulkhead (Ref. Fig. 403).
(a)At the fire shut off valve.
(Ref. 49-33-12 P. Block 401).
(b)At the frame FR.87.
(Ref. Para. 2. B. 2a.)
(c)At the frame FR84 (Typical).
1 Remove the nuts (9), the washers (11), the bolts (10) and the bonding strip (12) from the shrouded fuel feed line.
2 Remove the nut (4), the washer (3), the bolt (1) and the bonding strip (2) from the shrouded fuel feed line.
3 Cut and discard the locking wire of the spring clip (14).
4 Remove the spring clip (14).
5 Slide the coupling sleeve (5) in the appropriate direction.
6 Remove the nuts (7), the washers (8) and the bonding strip (6) from fuel feed line.
7 Cut and discard the locking wire of the fuel feed line nuts (13).
8 Loosen the nuts (13) of the fuel feed line (25).
9 Remove the feed fuel line (25).
10 Remove and discard the o-rings (23) and (24).
11 Install blanking caps on the ends of all the fuel lines.

(6)Removal of the bulk head seals (Ref. Fig. 401).
(a)Remove the bolts (4), the washers (3) the ring (5) and the sleeve (6).
(b)Remove and discard the o-rings (7) and (8) from the sleeve (6) and the shrounded fuel line (9).

(7)Remove the fuel feed line between the bulkhead and the elbow union.
(a)At the connection between the frames FR78 and FR79 and at Frames FR77, FR73, FR70, FR63, FR54.2, and FR54.
(Ref. Para. 2. B. 3c).
(b)At the frames FR67, FR60, and FR53.
(Ref. Para. 2. B. 2a).
(c)At the elbow union.
(Ref. Para. 2. B. 3c).

(8)Remove the fuel feed line between the elbow union and the wing center tank (Ref. 49-33-11, P. Block 401).

C. Preparation for Installation.
(1)Check fuel lines and bonding strips for damage and renew if necessary.
(2)Check that the O-ring sliding surfaces and grooves are free of drips and pollution from foreign objects (rough surface).
(3)Make certain that all the spacers (15) are secure (Ref. Fig. 402).

D. Installation
(1)Install elbow union to wing center tank.
(a)(Ref. 49-33-11, P. Block 401).
(2)Install the fuel feed line between elbow union and the bulkhead.
(a)At the frames FR54, FR54.2, FR63, FR70, FR73, FR77, and between the frames FR78 and FR79.
(Ref. Para. 2. D. 4a.).
(b)At the frames FR53, FR60, and FR67.
(Ref. Para. 2. D. 5b.).
(3)Install the bulkhead seals (Ref. Fig. 401).
(a)Apply grease (Mat. No. 04-012) to the new o-rings (7) and (8).
(b)Install the new o-ring (8) on the shrouded fuel line (9).
(c)Install the new o-ring (7) on the sleeve (6).
(d)Position the sleeve (6), the ring (5), the washers (3) and install the bolts (4).
(4)Install the fuel feed line between the bulkhead and the fire shut off valve. (Ref. Fig. 403)
(a)At the frame FR84: (Typical)
1 Remove the blanking caps from the ends of the fuel lines.
2 Apply grease (Mat. No. 04-012) to the new o-rings (23) and (24).
3 Install the new o-rings (23) and (24).
4 Postion the fuel feed line (25) in the shrouded feed line.
5 Tighten the fuel feed line nuts (13) and safety with lockwire (Mat. No. 19-018).
CAUTION : MAKE SURE THAT THE FUEL FEED LINE IS NOT STRESSED
6 Install the washers (8) the nuts (7) and the bonding strip (6). For electrical bonding refer to 20-28-11, P. Block 1.
7 Install the bolts (1), the washers (3) the nuts (4) and the bonding strip (2). For electrical bonding refer to 20-28-11, P. Block 1.
8 Slide the shrouded fuel feed line sleeve (5) into position.
9 Install the bolts (10), the washers (11), the bonding strip (12) and the nuts (9).
10 TORQUE the nuts (9) to 0.7 m.daN (62 lbf. in.).
11 Install the spring clip (14) and safety with lockwire (Mat. No. 19-018).
(b)Install the clamps (Typical) (Ref. Fig. 403).
1 Position the clamp (15) on the bracket, install the bolts (16), the washers (18) and the nuts (17).
(c)Install the shrouded fuel feed line to the supports (Typical) (Ref. Fig. 403).
1 Position the shrouded fuel feed line on the support (22).
2 Install the bolts (19), the washers (20) and the nuts (21).
(d)At the frame FR87.
(Ref. Para. 2. D. 5b.).
(e)At the APU fire shut off valve.
(Ref. No. 49-33-12, P. Block 401).
(5)Install the fuel feed line between the APU fire shut off valve and the adaptor (Ref. Fig. 402).
(a)At the APU fire shut off valve.

(Ref. No. 49-33-12, P. Block 401).

(b)At the adaptor (Typical).

1 Remove the blanking caps from the ends of the fuel lines.

2 Apply grease (Mat. No. 04-012) to the new o-rings (8) and (10).

3 Install the new o-rings (8) and (10).

4 Position the fuel feed line (12) in the shrouded feed line.

5 Tighten the fuel feed line nuts (9) and safety with lockwire (Mat. No. 19-018).

CAUTION : MAKE SURE THAT THE FUEL FEED LINE IS NOT STRESSED

6 Install the bonding strip (7) the washer (6) and the nut (5) of the fuel feed line (12).

7 Slide the shrouded fuel feed line sleeve (13) into position.

8 Install the spring clips (11) and safety with lockwire (Mat. No. 19-018).

9 Install the bolt (4), the bonding strip (3), the washer (2), and the nut (1).

(6)Install the fuel feed line to the APU.
(Ref. 49-10-00, P. Block 401).

(7)Replenish the APU fuel feed line (Ref. 49-32-11, P. Block 401).

(8)Return the APU fuel feed system to an operational condition.

(9)Remove the safety clips and the tags and close the circuit breakers 10QC, 11QC, 1QF, 50KA, 1KD, 58KD, and 71KD.

E. Fuel Leakage Test

NOTE : No leakage is permitted from the system.

(1)Do a fuel leakage test (Ref. 49-31-00, P. Block 501).

R (2)Do an air leakage test of the APU fuel shrouded line

R (Ref. 49-31-00, P. Block 501).

F. Close-Up

(1)Make certain that the working area is clean and clear of all the tools and any miscellaneous items of equipment.

(2)Install the cargo compartment sidewall panels 151FW, 151HW, 151KW, 151NW, 151QW, 161BW, 161DW, 161JW and 161MW. (Ref.25-55-10, P. Block 201).

(3)Remove the safety lock and close the AFT cargo compartment door 812. (Ref. 52-30-00, P. Block 301).

(4)Close the BULK cargo compartment door 813.

(5)Close the APU access doors 312AR and 313AL.

(6)Install the passenger compartment floor panels (Ref. 53-10-25, P. Block 401).

(7)Remove access platform.

FUEL CONTROL UNIT - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
WARNING : FUEL FEED LINE IS UNDER PRESSURE.
WARNING : SHUT DOWN APU IMMEDIATELY IF A FUEL LEAK IS OBSERVED. MAKE CERTAIN, THAT FIRE FIGHTING EQUIPMENT IS ADEQUATE AND AVAILABLE.
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.
CAUTION : DO NOT EXCEED STARTER MOTOR DUTY CYCLE OF THREE CONSECUTIVE START ATTEMPTS, WITH A 60 MINUTES COOLING PERIOD PRIOR TO ADDITIONAL START ATTEMPTS.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Protective Covers
C.	Blanking Caps and Plugs
D.	Circuit Breaker Safety Clips and Tags
E.	Torque Wrench, 0-0.7 m.daN (0-62 lbf.in.)
F.	Torque Wrench, 1-10 m.daN (7.4-74 lbf.ft)
G.	Container, 2 l (0.52 US gal.) Capacity
H.	Container, 20 l (5.3 US gal.) Capacity
J.	O-Rings
K.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
L.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
M. 98A28007570000	Adapter - Vent and Drain Valve, APU
N. Material No. 03-002	Oils (Ref. 20-31-00)
or	
Material No. 03-003	Oils (Ref. 20-31-00)
P. Material No. 04-010	Common Greases (Ref. 20-31-00)
Q. Material No. 04-012	Common Greases (Ref. 20-31-00)
R. Material No. 06-001A	Lubricants (Ref. 20-31-00)
S. Material No. 11-012	Cleaning Agent (Ref. 20-31-00)
Referenced Procedures	
- 49-10-00, P. Block 501	Power Plant
- 24-41-00, P. Block 301	AC External Power Control
- 12-13-49, P. Block 1	APU - Replenishing
- 51-90-00, P. Block 901	Nondestructive Testing Manual

2. Procedure
(Ref. Fig. 401)

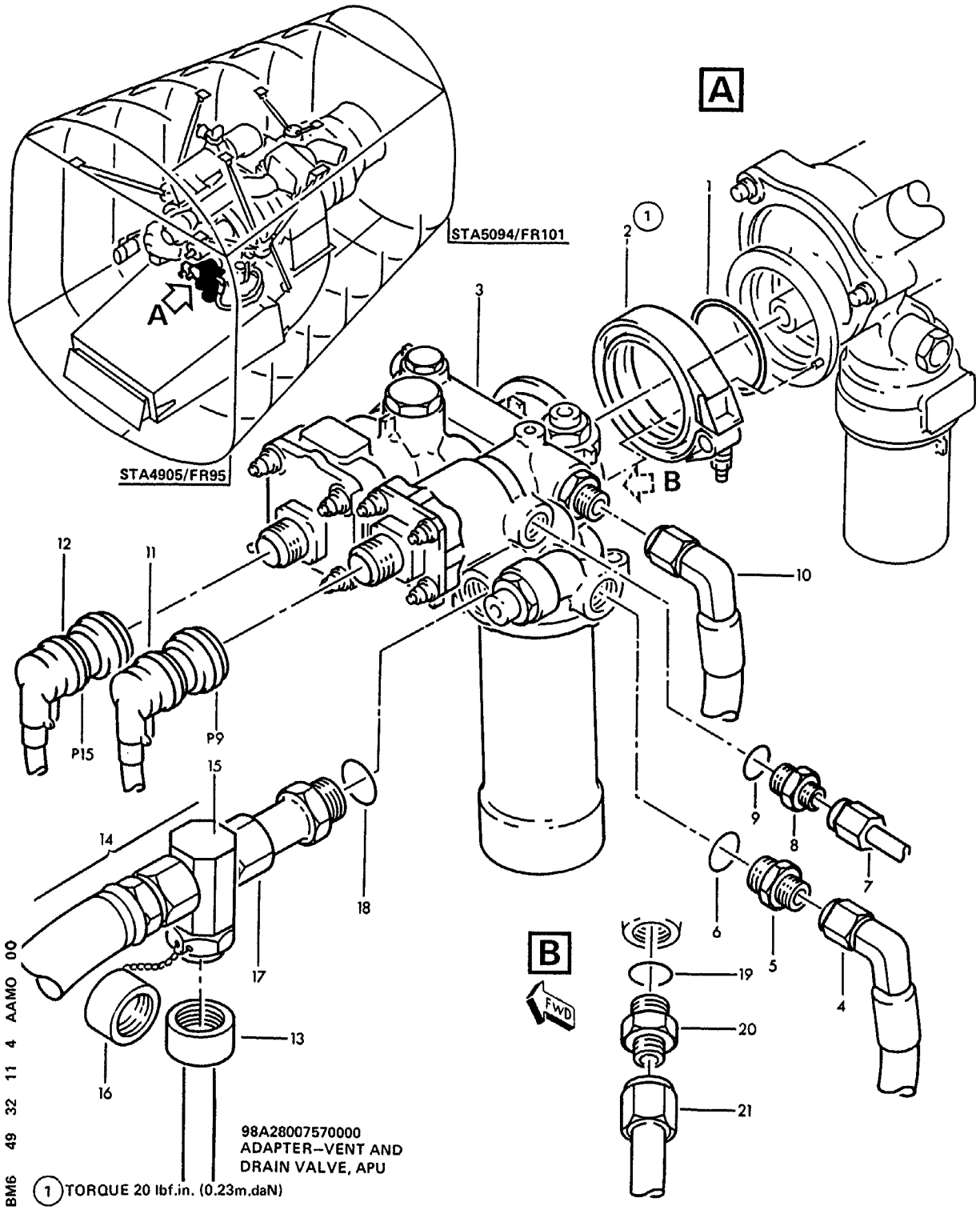
A. Job Set-Up

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(1)Make certain that the APU MASTER SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63



Fuel Control Unit
Figure 401

(3)Position access platform and open access doors 315AL and 316AR.

B. Removal

NOTE : Fit blanking caps, plugs or protective covers to all disconnected lines and electrical connectors and to mount flanges of fuel control unit (FCU) and oil pump.

(1)Remove lockwire from connectors P9 (11) and P15 (12).
(2)Disconnect electrical connectors P9 (11) and P15 (12).
(3)Drain fuel feed line assy (14), using vent and drain valve adapter.
(a)Position container, 2 l (0.53 US gal) capacity, below fuel feed line vent and drain valve port (15).
(b)Direct drain hose of vent and drain valve adapter (13) into container.
(c)Remove cap (16) from fuel feed line vent and drain valve port (15).
(d)Install vent and drain valve adapter (13) to fuel feed line vent and drain valve port (15).
(e)After draining remove vent and drain valve adapter (13) from fuel feed line vent and drain valve port (15).
(f)Install cap (16) to fuel feed line vent and drain valve port (15).
(g)Remove container.
(4)Remove fuel feed line assembly.
(a)Cut and remove lockwire and release coupling nut of fitting (17).
(b)Remove fuel feed line assembly (14) and install blanking cap and plug.
(c)Stow fuel feed line assembly (14) at appropriate bracket on Frame 95.
(5)Position container below FCU (3).
(6)Disconnect drain line (21), fuel line (7), IGV actuator pressure line (10) and IGV actuator return line (4). Install blanking caps and plugs.
(7)Release clamp (2) and remove FCU (3).
(8)Remove and discard O-ring (1).
(9)Install appropriate protective covers to removed FCU and oil pump apertures.

C. Preparation of Replacement Component
(1)On removed FCU:
(a)Remove lockwire and fittings (5, 8, 17, 20).
(b)Remove and discard O-rings (6, 9, 18, 19).
(c)Install blanking caps and plugs to all apertures.
(2)On replacement FCU:
CAUTION : IF THE FUEL FEED LINE FITTING IS NOT OF THE ONE PIECE TYPE WITH THE PART NUMBER MARKED ON IT, CARRY OUT A DYE PENETRANT INSPECTION.
(a)Carry out a dye penetrant inspection of the fuel feed line fitting for cracking round the weld (Ref.NTM 51-90-00 P.Block 901). If necessary mark the part number on the fitting.
(b)Clean threads of fitting (17) with cleaning agent (Mat. No. 11-012).
(c)Inspect threads and cones of fittings (5, 8, 17, 20) for damage.
(d)Lubricate new O-rings (6, 9, 18, 19) with vaseline (Mat. No. 04-012).
(e)Install new O-rings (6, 9, 18, 19) to fittings (5, 8, 17, 20).
(f)Lubricate threads of fitting (17) with lubricant (Mat. No. 06-001A).
(g)Install fitting (17).
(h)TORQUE fitting (17) to 5.5 m.daN (40.56 lbf.ft) and safety with lockwire.
(j)Install fittings (5, 8, 20) and safety with lockwire.

D. Preparation for Installation
(1)Inspect FCU and oil pump mount flanges for damage.
(2)Inspect FCU splined shaft and oil pump splined sleeve for damage.
(3)Inspect clamp (2) for damage.

E. Installation

NOTE : Remove blanking caps, plugs and protective covers from lines, electrical connectors and mount flanges of FCU and oil pump before connection.

(1)Apply oil (Mat. No. 03-002 or 03-003) to O-ring (1) and install on oil pump housing.

R (2)Apply oil (Mat. No. 03-002 or 03-003) to FCU splined shaft and oil pump splined sleeve.

NOTE : Make certain, that alignment hole on FCU is aligned with alignment pin on oil pump.

(3)Carefully insert FCU splined shaft into oil pump splined sleeve, and push FCU (3) into position.

(4)Install clamp (2).

(5)TORQUE nut of clamp (2) to 20 lbf.in. (0.23 m.daN).

NOTE : Make certain, that clamp (2) is seated. Retorque clamp nut to required TORQUE value.

(6)Connect drain line (21), fuel line (7), IGV actuator pressure (10) and return line (4).

(7)Clean threads of coupling nut with cleaning agent (Mat. No. 11-012).

(8)Check coupling nut threads for damage.

(9)Lubricate coupling nut of fitting (17) with lubricant (Mat. No. 06-001A).

(10)Install fuel feed line assembly (14) and TORQUE coupling nut of fitting (17) to 5.5 m.daN (40.56 lbf.ft)

(11)Safety coupling nut of fitting (17) with lockwire.

(12)Connect electrical connectors P9 (11) and P15 (12).

(13)Safety connectors P9 (11) and P15 (12) with lockwire.

F. Purging of Fuel Feed Line

(1)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(2)Make certain that electronic racks ventilation is correct.

(3)Purge fuel feed line.

(a)Position container, 20 l (5.3 US gal.) capacity, below fuel feed line vent and drain valve port (15).

(b)Remove cap (16) from vent and valve drain port (15), install vent and drain valve adapter (13) and direct drain hose into container.

(c)Remove safety clips and tags and close circuit breakers 10QC, 11QC and 1QF.

(d)On Frame 95, press VENT-APU FUEL LINE pushbutton.

WARNING : FUEL FEED LINE IS UNDER PRESSURE.

(e)Remove vent and drain valve adapter (13), when fuel outflow from drain hose is airfree.

(f)Release VENT-APU FUEL LINE pushbutton after vent and drain valve has closed.

(g)Install cap (16) of vent and drain valve port (15).

(h)Remove safety clips and tags and close circuit breakers 1KD, 58KD, 71KD and 50KA.

G. Test

(1)Check oil level in gearbox sump. Replenish if necessary (Ref. 12-13-49, P. Block 1).

CAUTION : DO NOT EXCEED STARTER MOTOR DUTY CYCLE OF THREE CONSECUTIVE START ATTEMPTS, WITH A 60 MINUTES COOLING PERIOD PRIOR TO ADDITIONAL START ATTEMPTS.

WARNING : SHUT DOWN APU IMMEDIATELY IF A FUEL LEAK IS OBSERVED. MAKE CERTAIN, THAT FIRE FIGHTING EQUIPMENT IS ADEQUATE AND AVAILABLE.

(2)Start and operate APU (Ref. 49-10-00, P. Block 501).

NOTE : More than one start attempt may be required to achieve initial run up.

(3)Check fuel control unit connections for leakage.

(4)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.

(2)Close access doors 315AL and 316AR and remove access platform.

(3)De-energize aircraft electrical network and disconnect external ground power unit (Ref. 24-41-00, P. Block 301).

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1. Solenoid Valve and Check Valves - Removal/Installation

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Container 2.0 l (0.52 US gal) capacity
(5)	Torque Wrench up to 1.70 m daN (0-150 lbf. in.)
(6)	O-rings
(7)	Corrosion Resistant-Steel Lockwire 0.8 mm (0.032 in.) dia.
(8)Material No. 04-505	Common Greases (Ref. Consumable Material List, Part 2)
Referenced Procedures	
- 49-10-00, P. Block 501	Power Plant
- 49-32-12, P. Block 401	Fuel Flow Divider and Drain Valve

B. Procedure

(1)Job Set-Up

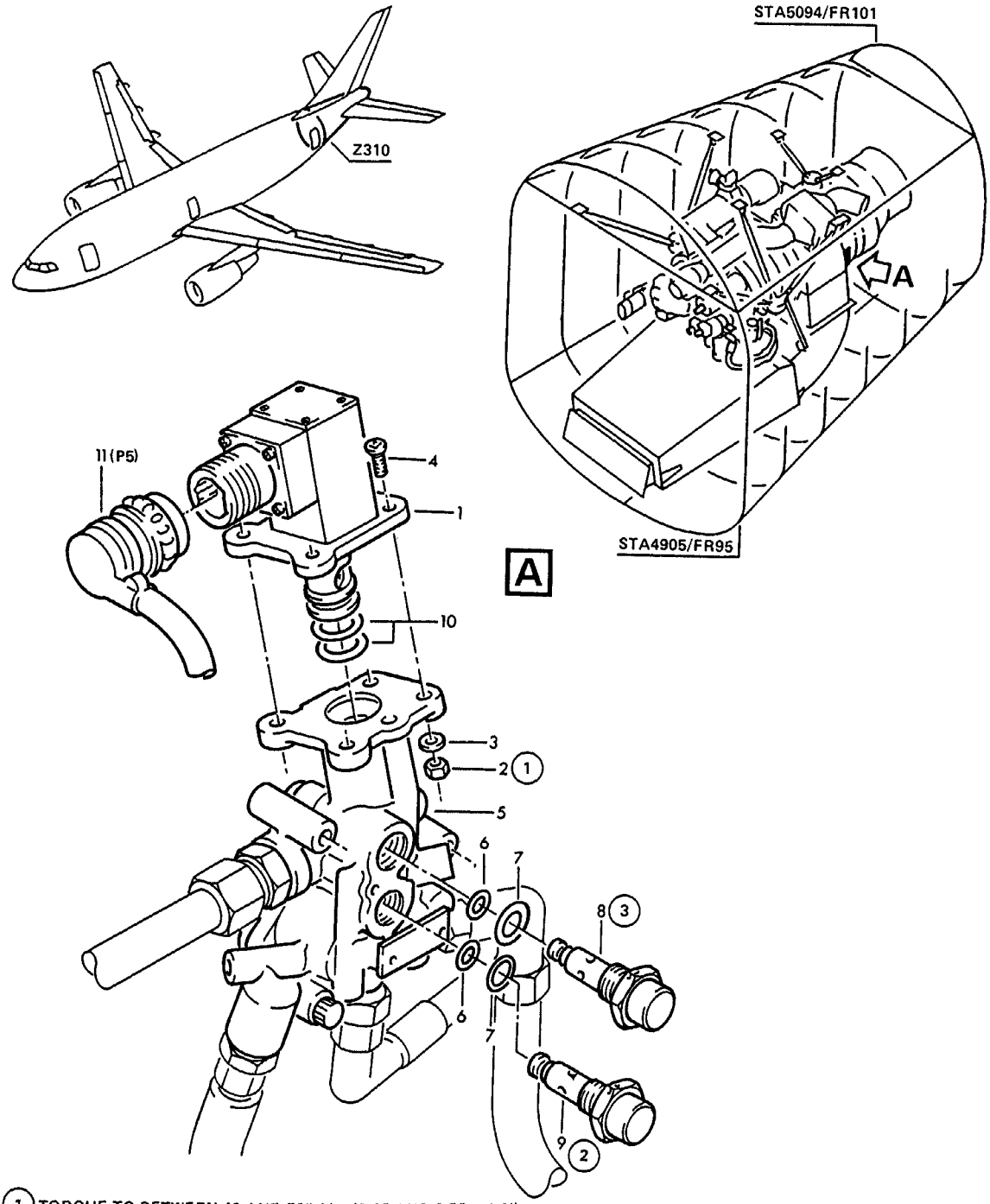
(Ref. Fig. 201)

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(a)Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(b)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63



BM6 49 32 12 2 AAMO 00

(1) TORQUE TO BFTWEEN 40 AND 50lbf.in. (0.45 AND 0.56m.daN)
(2) TORQUE TO BETWEEN 65 AND 70 lbf.in. (0.73 AND 0.79m.daN)
(3) TORQUE TO BETWEEN 120 AND 130 lbf.in. (1.35 AND 1.47m.daN)

Solenoid Valve and Check Valves
Figure 201

(c)Position access platform and open access doors 315AL and 316AR.

(2)Removal of Solenoid Valve

NOTE: Install blanking caps and plugs to all apertures, disconnected lines and the electrical connector.

(a)Cut and remove lockwire. Disconnect electrical connector (11) P5 from solenoid valve (1).

(b)Position container below fuel flow divider and drain valve (5).

(c)Remove nuts (2), washers (3) and bolts (4).

(d)Remove solenoid valve (1) from fuel flow divider and drain valve (5).

(e)Allow any residual fuel to drain into container.

(f)Remove container.

(g)Remove and discard O-rings (10).

(3)Installation of Solenoid Valve

(a)Remove blanking caps and plugs from solenoid valve (1) solenoid valve electrical connector (11) and fuel flow divider and drain valve (5).

(b)Apply a thin coat of grease (Mat. No. 04-505) to new O-rings (10)

1 Install new O-rings (10) onto solenoid valve (1).

(c)Position solenoid valve (1) onto fuel flow divider and drain valve (5). Install bolts (4) washers (3) and nuts (2).

1 TORQUE nuts (2) to between 40 and 50 lbf. in. (0.45 and 0.56 m daN).

(d)Connect electrical connector (11) P5.

1 Safety electrical connector using lockwire 0.8 mm (0.032 in.) dia.

(4)Removal of Check Valves

(a)Position container below fuel flow divider and drain valve (5).

(b)Cut and remove lockwire from check valves (8, 9).

(c)Remove check valves (8, 9).

1 Remove and discard O-rings (6, 7).

(d)Allow any residual fuel to drain into container.

(e)Install blanking plugs to check valve apertures on fuel flow divider and drain valve (5).

(f)Install blanking caps to check valves (8, 9).

(g)Remove container.

(5)Installation of Check Valves

(a)Remove blanking plugs from check valve apertures on fuel flow divider and drain valve (5).

(b)Remove blanking caps from check valves (8, 9)

(c)Apply a thin coat of grease (Mat. No. 04-505) to new O-rings (6, 7)

1 Install new O-rings (6, 7) onto check valves (8, 9)

(d)Install check valves (8, 9) onto fuel flow divider and drain valve (5).

1 TORQUE upper check valve (8) to between 120 and 130 lbf. in. (1.35 to 1.47 m. daN).

2 TORQUE lower check valve (9) to between 65 and 70 lbf. in. (0.73 to 0.79 m. daN).

(e)Safety check valves (8, 9) using lockwire 0.8 mm (0.032 in.) dia.

(6)Test
  (a)Solenoid Valve and Check Valves - Functional Test
    1 Remove safety clips and tags and close following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC, 1QF and 71KD.
    2 Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
    3 Check solenoid valve (1) and check valves (8, 9) seating areas for fuel leaks.
      NOTE : No leaks are permissible.
    4 Shut down APU (Ref. 49-10-00, P. Block 501).
(7)Close Up
  (a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
  (b)Close access doors 315AL and 316AR and remove access platform.

FUEL FLOW DIVIDER AND DRAIN VALVE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Circuit Breaker Safety Clips and Tags.
D.	Container, 2 l (0.52 US gal.) Capacity
E.	Torque Wrench, 0-1.70 m.daN (0-150 lbf.in.)
F.	O-Rings
G.	Corrosion - Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
H. Material 04-505	Common Grease (Ref. Consumable Material List, Part 2)
Referenced Procedure - 49-10-00, P. Block 501	Power Plant

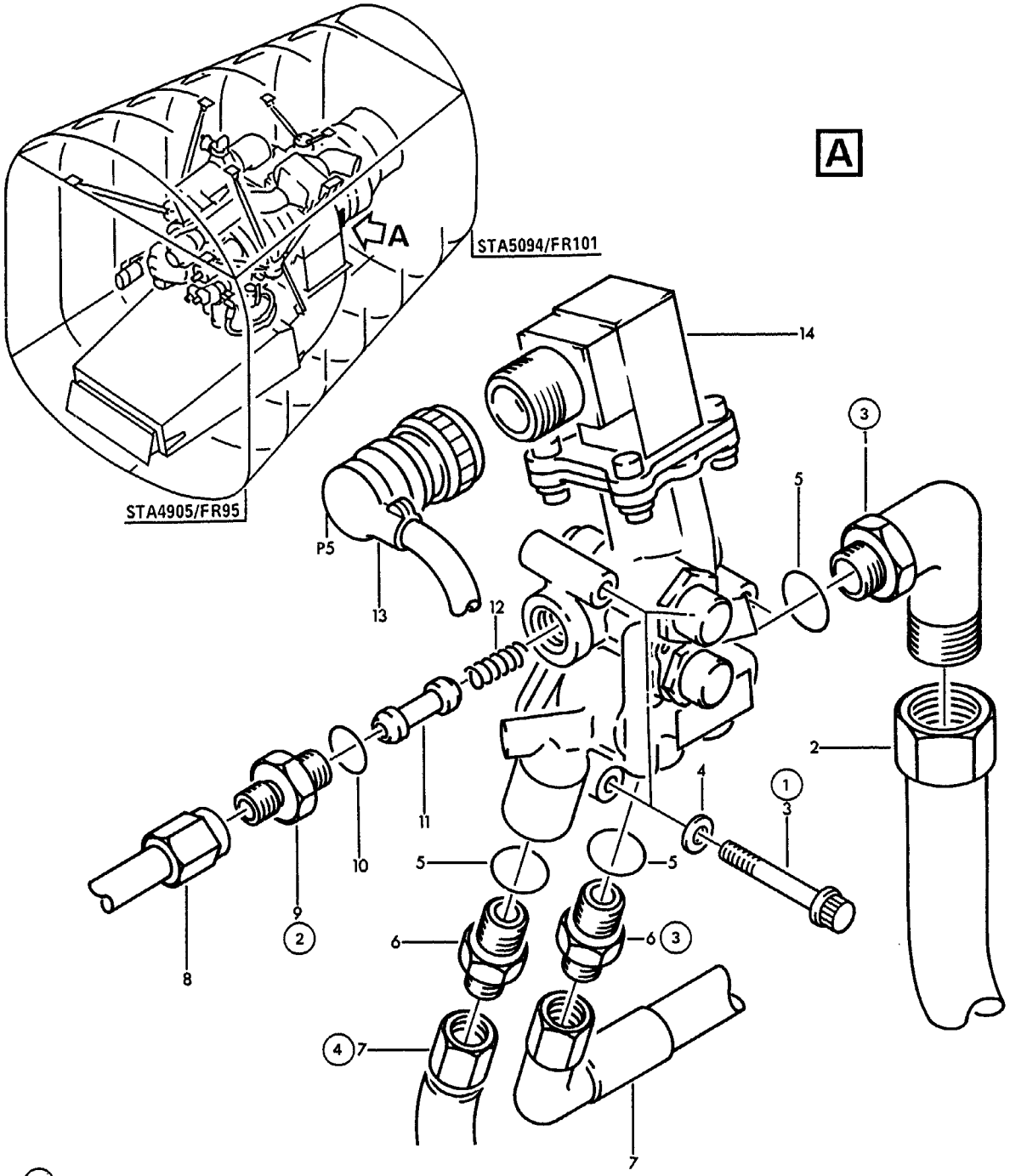
2. Procedure

A. Job Set-Up
(Ref. Fig. 401)

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(1) Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.
(2) Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63



BM6 49 32 12 4 AAMO 00

(1) TORQUE TO BETWEEN 50 AND 53 lbf.in. (0.56 AND 0.60m.daN)
(2) TORQUE TO BETWEEN 75 AND 80 lbf.in. (0.85 AND 0.90m.daN)
(3) TORQUE TO BETWEEN 95 AND 105 lbf.in. (1.07 AND 1.19m.daN)
(4) TORQUE TO BFTWEEN 120 AND 135 lbf.in. (1.36 AND 1.53m.daN)

Fuel Flow Divider and Drain Valve
Figure 401

(3)Position access platform and open access doors 315AL and 316AR.

B. Removal

NOTE: Install blanking caps or plugs to all apertures, disconnected lines and the electrical connector.

(1)Cut and remove lockwire from electrical connector (13) P5. Disconnect electrical connector (13) from fuel flow divider and drain valve (14).
(2)Position container below fuel flow divider and drain valve (14).
(3)Disconnect fuel supply line (8) primary and secondary fuel manifold hoses (7) and drain line (2).
(4)Allow residual fuel to drain into container.
(5)Remove bolts (3), washers (4) and fuel flow divider and drain valve (14).
(6)Remove container.

C. Preparation for Installation.

(1)If fuel flow divider and drain valve is to be replaced:
(a)Remove unions (6, 1).
(b)Remove and discard O-rings (5).
(c)Lubricate new O-rings (5) using grease (Mat. No. 04-505).
(d)Install new O-rings (5) to unions (6, 1).
(e)Remove blanking plugs from replacement fuel flow divider and drain valve (14).
(f)Install unions (6, 1) to replacement fuel flow divider and drain valve (14).
1 TORQUE unions (6, 1) to between 95 and 105 lbf.in. (1.07 and 1.19 m. daN).

(2)If fuel flow divider and drain valve is not to be replaced, inspect fuel pressure filter element (11):
(a)Remove union (9), filter element (11) and spring (12).
(b)Remove and discard O-ring (10).
(c)Check filter element (11) for cracks, tears or any other damage or contamination. Replace or clean as necessary.
(d)Check union (9) for evidence of stripped threads, cracks or gouges. Replace if necessary.
(e)Check spring (12) for cracks and damage. Replace if necessary.
(f)Remove blanking plug from fuel flow divider and drain valve (14).
(g)Install spring (12) and filter element (11) to fuel flow divider and drain valve (14).
(h)Lubricate new O-ring (10) using grease (Mat. No. 04-505).
(j)Install new O-ring (10) to union (9).
(k)Install union (9) to fuel flow divider and drain valve (14).
1 TORQUE union (9) to between 75 and 80 lbf.in. (0.85 and 0.90 m.daN).

D. Installation

NOTE: Remove blanking caps and plugs from all lines and from electrical connector before connection.

(1)Position fuel flow divider and drain valve and install washers (4) and bolts (3).

1 TORQUE bolts (3) to between 50 and 53 lbf.in. (0.56 and 0.60 m.daN).

(2)Connect drain line (2), primary and secondary fuel manifold hoses (7) and fuel supply line (8).

1 TORQUE fittings of manifold hoses (7) to between 120 and 135 lbf.in. (1.36 and 1.53 m.daN).

(3)Connect electrical connector (13) P5.

1 Safety electrical connector with lockwire.

E. Functional Test

(1)Remove safety clips and tags and close following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC, 1QF and 71KD.

(2)Start and operate APU with no load. (Ref. 49-10-00 P. Block 501).

(3)Check all fuel connections for fuel leaks.

NOTE : Leaks are not permissible.

(4)Shut down APU. (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close access doors 315AL and 316AR and remove access platform.

R APU PUMP (8QC) - REMOVAL/INSTALLATION
R

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

CHECK THAT THE LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 2.60 m (8 ft. 4 in.)
B.	Containers
C.	Lint-Free Cloth
D. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

2. Procedure

A. Job Set-Up
(1)Open left main gear door (Ref. 32-12-11, P. Block 301).
(2)Position access platform 2.60 m (8 ft. 8 in.).
(3)In flight compartment, on APU section of panel 429VU, make certain that MASTER SW is in OFF position.
Make certain FUEL PUMP pushbutton switch is pressed (in).
(4)Display a warning notice on panel 429VU prohibiting operation of APU pump controls.
(5)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	317/B54
131VU	APU/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52

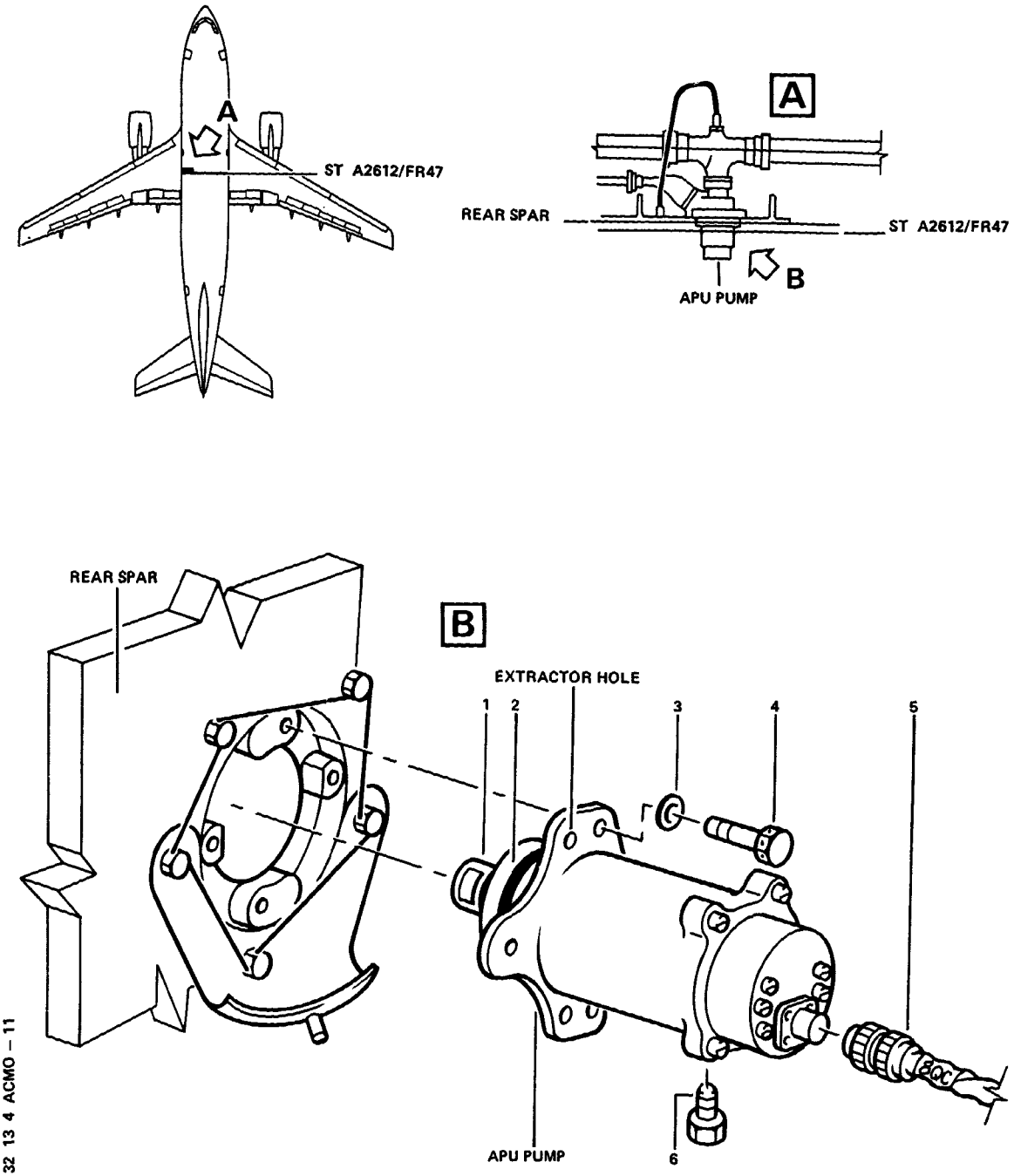
(6)Install container under APU fuel pump.

B. Removal
(Ref. Fig. 401)
(1)Disconnect electrical connector (5) from APU fuel pump.
(2)Cut and remove lockwire, remove the four bolts (4) and washers (3).
(3)Insert extractor bolts in the two holes provided in APU fuel pump.
(4)Cut and remove lockwire, remove drain plug (6). Recover fuel remaining in pump.
(5)Remove pump using extractor bolts.
NOTE : APU fuel pump canister operation
During APU pump removal, valve return spring seats the valve. The bypass valves remain seated by the pressure of their return springs.
Fuel flow from the crossfeed and APU fuel feed system is thus cut off.
(6)Install drain plug on APU pump and remove extractor bolts.

C. Preparation of Replacement Component
(1)Depreserve the remplacement component
(2)Smear new O-rings (1) and (2) with fuel or Material No.04-012 and install in their respective grooves.
(3)Clean and inspect APU fuel pump interface and/or adjacent area.

D. Installation
(1)Make certain that canister O-ring mating surfaces are clean and in good condition.
(2)Position pump on canister and correctly position attachment flange using bolt (4).
NOTE : The dissymmetrical arrangement of bolt holes ensures that valve is correctly positioned for installation.
(3)Install washers (3) and bolts (4).
(4)Install APU pump by tightening bolts (4) in diametrically opposed sequence.
NOTE : During pump installation, the end of pump body unseats valve allowing fuel to flow into canister and pump.
(5)Tighten bolts (4) and wirelock.
(6)Check for correct condition of electrical connector (5) and connect connector (5) to pump.
(7)Check that drain plug (6) is correctly tightened and wirelocked.

E. Test
(1)Close circuit breakers 50KA, 1QC, 10QC and 11QC.
(2)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.
(3)On overhead panel, make certain that APU FIRE handle is pushed in (APU LP valve open).
(4)In flight compartment, on APU section of panel 429VU,
(a)Place MASTER SW in ON position.
(b)Release FUEL PUMP pushbutton switch, OVRD legend comes on.
(5)In hydraulics compartment at zone 147, aurally check that APU fuel pump operates correctly.
(6)In flight compartment, on APU section of panel 429VU



APU Pump - Installation
Figure 401

(a)Press FUEL PUMP pushbutton switch, OVRD legend goes off.
(b)Place MASTER SW in OFF position to shut down APU pump.

F. Close-Up
(1)Remove fuel recovery containers.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Remove access platform.
(4)Close left main gear main door (Ref. 32-12-11, P. Block 301).
(5)Remove warning notices.
(6)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

R APU PUMP CANISTER - REMOVAL/INSTALLATION
R

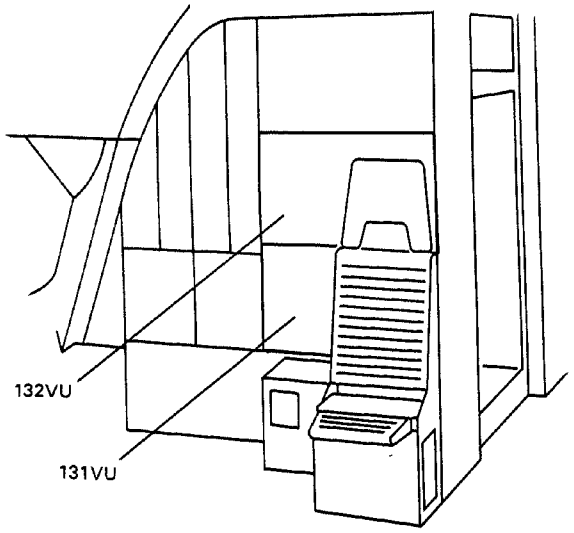
WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.
BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
MAKE CERTAIN THAT LANDING GEAR GROUND SAFETIES, INCLUDING WHEEL CHOCKS, ARE IN POSITION.
BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORKING AREA.

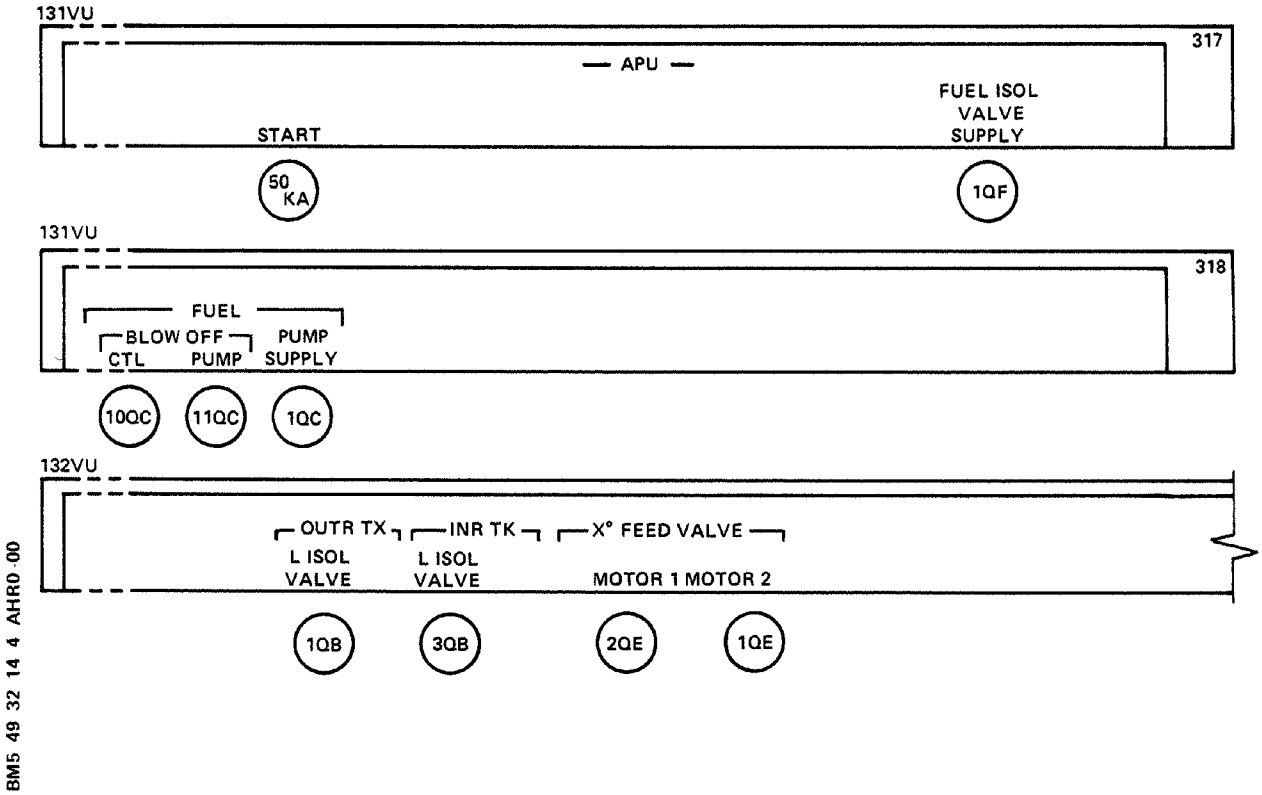
1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 2.60 m (8 ft. 8 in.)
B.	Containers
C.	Blanking Plugs/Caps
D.	Lint-Free Cloth
E. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-00-00, P. Block 301	General
- 28-11-29, P. Block 301	Center Tank Manhole Cover
- 28-21-00, P. Block 1	Fuel Pump System
- 28-21-12, P. Block 1	Inner Tank Booster Pump
- 28-25-00, P. Block 301	Tank Isolation System
- 28-24-11, P. Block 401	APU Pump
- 32-12-11, P. Block 301	Main Gear Main Door - Ground Door(s) Opening)

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
Make certain that electronics racks ventilation is correct.
(2)Defuel or transfer fuel from center tank (Ref. 28-25-00, P. Block 301).
(3)In flight compartment,
(a)On FUEL section of panel 430VU
1 Make certain that left wing INR TK/ and OUTR TK/ISOL VALVES pushbutton switches are released (out) (OFF legends on).
2 Make certain that flowbar on X FEED pushbutton switch is cross line (crossfeed valve closed).
3 Display warning notices on ISOL VALVES and X FEED pushbutton switches prohibiting their operation.
(b)On APU section of panel 429VU
1 Make certain that MASTER SW is in OFF position.





APU Pump Canister - Circuit Breakers
Figure 401

2 Display a warning notice prohibiting operation of MASTER SW.

(c)On APU section of maintenance panel 472VU

1 Make certain that SHUT legend on ISOL VALVE annunciator is on.

(4)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
132VU	OUTR TK/L ISOL/VALVE	1QB	324/L55
132VU	INR TK/L ISOL/VALVE	3QB	324/L57
132VU	X FEED VALVE/MOTOR 2	1QE	324/L61
132VU	X FEED VALVE/MOTOR 1	2QE	324/L60
131VU	APU/START	5OKA	317/B54
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63

(5)Open left main landing gear door (Ref. 32-12-11, P. Block 301).

(6)Position access platform.

(7)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(8)Remove access door 147AZ (Ref. 28-11-29, P. Block 301).

(9)Remove APU pump (Ref. 28-24-11, P. Block 401).

(10)Place containers in center tank, under APU pump canister.

B. Removal

WARNING : BEFORE UNDERTAKING MAINTENANCE OPERATIONS INSIDE A FUEL TANK, THE PRESCRIBED SAFETY PRECAUTIONS MUST BE RIGOROUSLY OBSERVED (REF. 28-00-00, P. BLOCK 301).

(1)Removal of lines

(Ref. Fig. 402)

(a)Disconnect pressure connector line (7) from T-union (10) and pressure switch. Recover any fuel remaining in line.

(b)Disconnect bonding leads (1), (2), (5), (12) at A, B, C and D.

(c)Remove the four union nuts (3).

(d)Support T-union (10) and lines (6) and (13).

(e)Unlock and remove the four bolts (8), discard the four lock-washers (9).

Recover any fuel remaining in lines.

(f)Disconnect and remove line (6) by pushing line (13) fully home on the end of crossfeed valve and then T-union (10) on line (13).

(g)Remove line (13) and T-union (10).

(h)Cap crossfeed valve and bulkhead union (RIB1).

(j)Remove containers from center tank.

(2)Removal of canister.

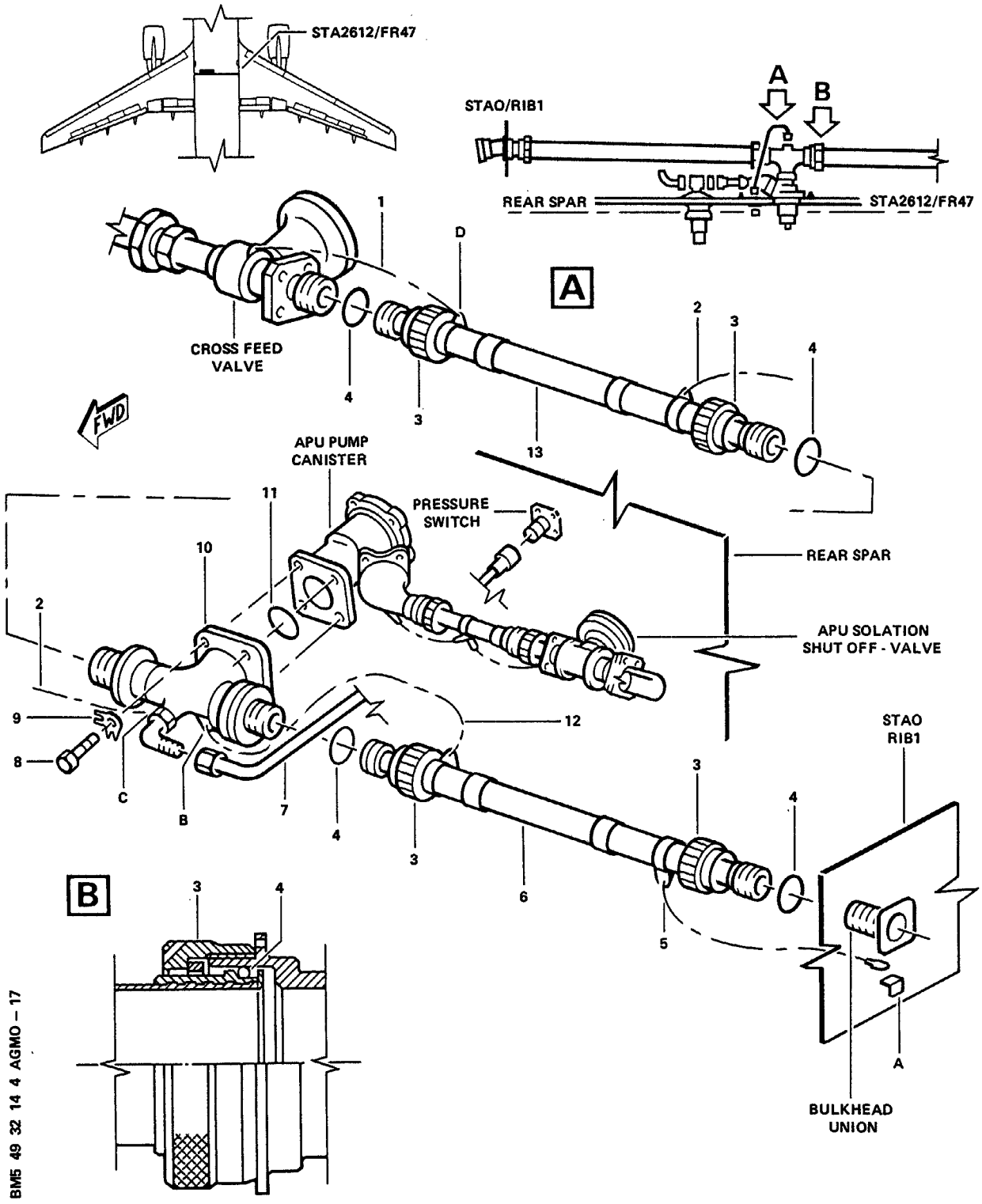
(Ref. Fig. 403)

(a)Disconnect bonding lead (36) from APU isolation valve.

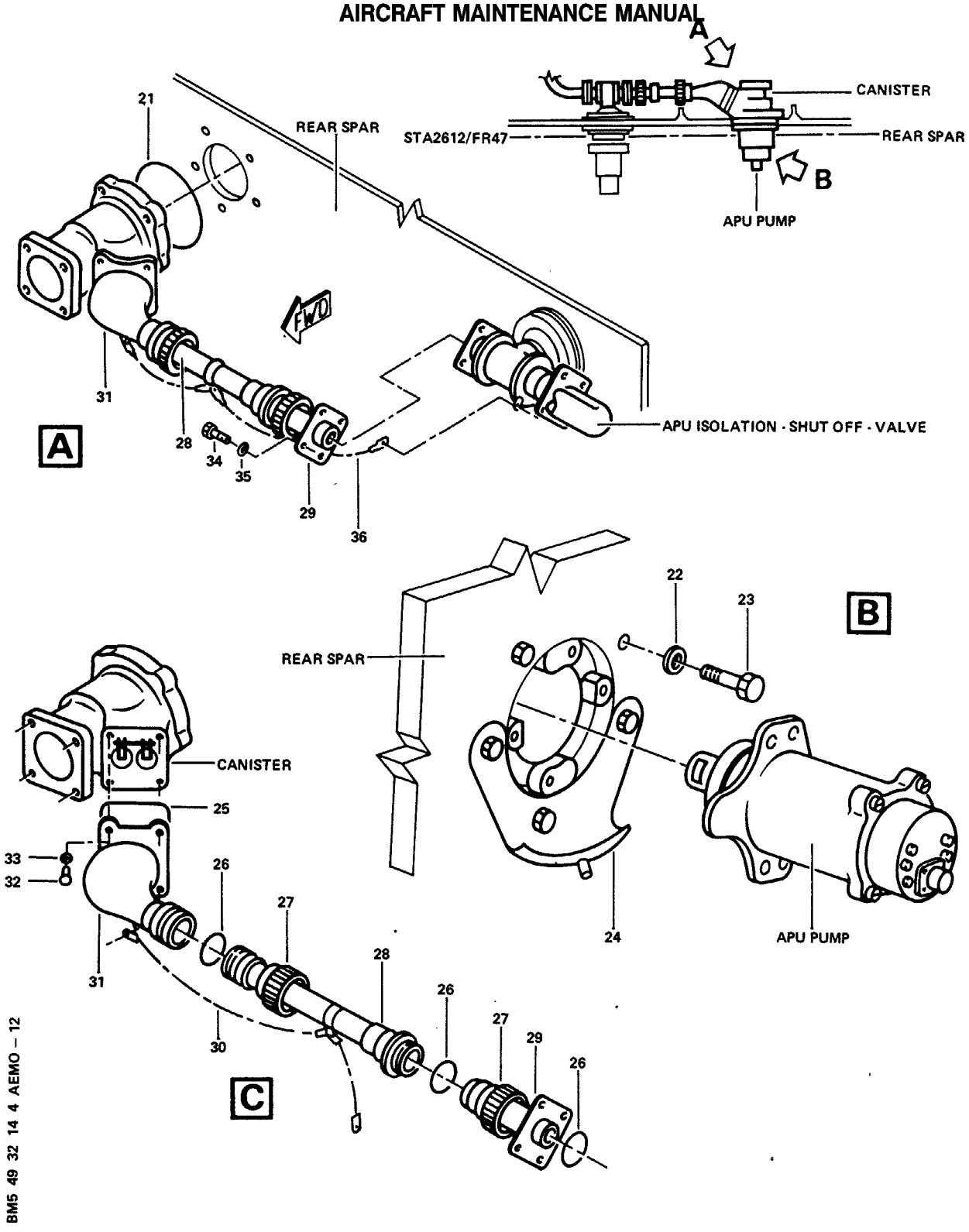
(b)Remove the four bolts (34) and the four washers (35).

(c)Support canister.

(d)Cut and remove lockwire ; remove the five bolts (23) and washers (22). Remove drip shield (24).



Removal of Crossfeed Valve Lines Supplying APU Fuel Pump
Figure 402



Removal of APU Pump Canister
Figure 403

(e)Fully unscrew union on line (28) and union (29) to free line (28) from outlet line (31). Union (29) is removed from APU isolation valve.
(f)Remove canister complete with outlet lines from the front face of rear spar.
(g)Cap APU isolation valve.
(h)Disconnect bonding lead (30) from outlet line (31).
(j)Loosen the two union nuts (27).
(k)Remove union (29) from line (28).
(l)Remove the four bolts (32) and washers (33) and remove outlet line (31) from canister.

C. Preparation of Replacement Component
(1)Depreserve replacement component.
(2)Remove O-rings (26) from line (28) and union (29).
(3)Remove O-ring (25) from outlet line (31).
(4)Clean and check for correct condition of lines (28), (31), union (27) and associated ends.
(5)Install a new O-ring (25) in groove of outlet line (31) and attach outlet line to canister using the four bolts (32) and washers (33). Tighten bolts.
(6)Install a new O-ring (26) in grooves in end of line (28) and in union (29).
(7)Smear line ends and O-rings with fuel or material No. 04-012.
(8)Push line (28) on to line (31). Push union (29) on to line (28). Install and tighten nuts (27). Wirelock (Ref. 28-00-00, P. Block 301).
(9)Connect bonding lead (30) to outlet line (31).
(10)Clean and inspect component interface and/or adjacent area.

D. Installation of Canister
(1)Remove blanking plug/cap from APU isolation valve.
(2)Install a new O-ring (21) in groove of canister.
(3)Push union (29) and line (28) fully home on outlet line (31).
(4)Install canister, complete with outlet lines, on the front face of rear spar. Support lines.
(5)Install drip shield (24), the five washers (22) and the five bolts (23).
(6)Tighten the five bolts (23) in diametrically opposed sequence and wirelock.
(7)Connect union (29) and APU isolation valve, making certain that O-ring (26) is correctly positioned.
(8)Install washers (35) and the four bolts (34). Tighten bolts.
(9)Connect bonding lead (36) to APU isolation valve.
(10)Install APU pump. (Ref.28-24-11, P. Block 401).

E. Installation of Lines
(1)Preparation of lines
(Ref. Fig.)
(a)Remove O-rings (4) from lines (13) and (6).
(b)Remove O-ring (11) from T-union (10).
(c)Clean and check for correct condition of lines, unions and associated end fittings.
(d)Install new O-ring (4) in groove of lines (13) and (6) ends.

(e)Smear line ends and O-rings with fuel or Material No. 04-012.

(2)Installation

(a)Remove blanking plugs/caps from crossfeed valve and bulkhead union.

(b)Push home end of line (13) which is not equipped with bonding lead, on crossfeed valve. Install union nut (3).

(c)Push home T-union (10), (bonding leads downwards), on line (13). Install union nut (3).

(d)Push line (13) and T-union (10) fully home. Install line (6) and union nuts (3). Support line assembly.

(e)Install a new O-ring (11) in the groove of T-union. Attach T-union to canister using new lock-washers (9) and bolts (8).

(f)Tighten and lock the four bolts (8).

(g)Connect bonding leads (1), (2), (5) and (12) at A, B, C and D.

(h)Check for correct condition of pressure connector (7) line ends and connect line to T-union (10) and to pressure switch. Tighten union nuts.

F. Test

(1)Make certain that no other maintenance operations are being carried out on the fuel system.

(2)Energize the aircraft electrical network, (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.

(3)Remove safety clip and tag and close circuit breaker 3QB.

(4)On FUEL section of panel 430VU
Press left wing INR TK/ISOL VALVES pushbutton switch (OFF legend off) to open inner tank isolation valve.

(5)On mechanical center pedestal 9VU
- make certain that ENG 1 HP fuel shut off valve control lever is in OFF position.

(6)Start up a left inner tank pump (Ref. 28-21-12, P. Block 1).

(7)With fuel system pressurized, check removed portion of the system for leakage.

(8)Shut down the left inner tank pump (Ref. 28-21-12, Page Block 1).

G. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close access door 147AZ (Ref. 28-11-29, P. Block 301).

(3)Remove access platform.

(4)Close left main landing gear door (Ref.32-12-11, P. Block 301).

(5)Remove safety clips and tags and close circuit breakers 1QE, 2QE, 1QB, 50KA, 1QF, 1QC, 10QC and 11QC.

(6)Remove warning notices.

(7)On FUEL section of panel 430VU

(a)Check that INR TK/ and OUTR TK/ISOL VALVES pushbutton switches are pressed (in) ; flowbars on and OFF legends off.

(8)On APU section of panel 429VU, check that MASTER SW is in OFF position.

(9)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(10)Remove all ground handling and maintenance equipment, standard and special tools, together with ground power equipment, all access equipment

and miscellaneous items.

APU FUEL PUMP PRESSURE SWITCH (15QC) - REMOVAL/INSTALLATION

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

CHECK THAT THE LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 2.50 m (8 ft. 4 in.)
B.	Containers
C.	Lint-Free Cloth
D. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-21-00, P. Block 501	Fuel System Pump
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

2. Procedure

A. Job Set-Up
(1)Open left main gear door (Ref. 32-12-11, P. Block 301).
(2)Position access platform.
(3)In flight compartment, on APU section of panel 429VU
(a)Make certain that MASTER SW is in OFF position.
(b)Make certain that FUEL PUMP pushbutton switch is pressed (in).
(4)Display a warning notice, on APU section of panel 429VU prohibiting APU pump operation.
(5)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
124VU	APU/START	50KA	401/E70
124VU	APU/WARN	2KD	401/E72
124VU	FUEL/PUMP/SUPPLY	1QC	402/D71
124VU	FUEL/BLOW OFF/CTL	10QC	402/D69
124VU	FUEL/BLOW OFF/PUMP	11QC	402/D70
131VU	APU/START	50KA	317/B54
131VU	APU/WARN	2KD	317/B56
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52

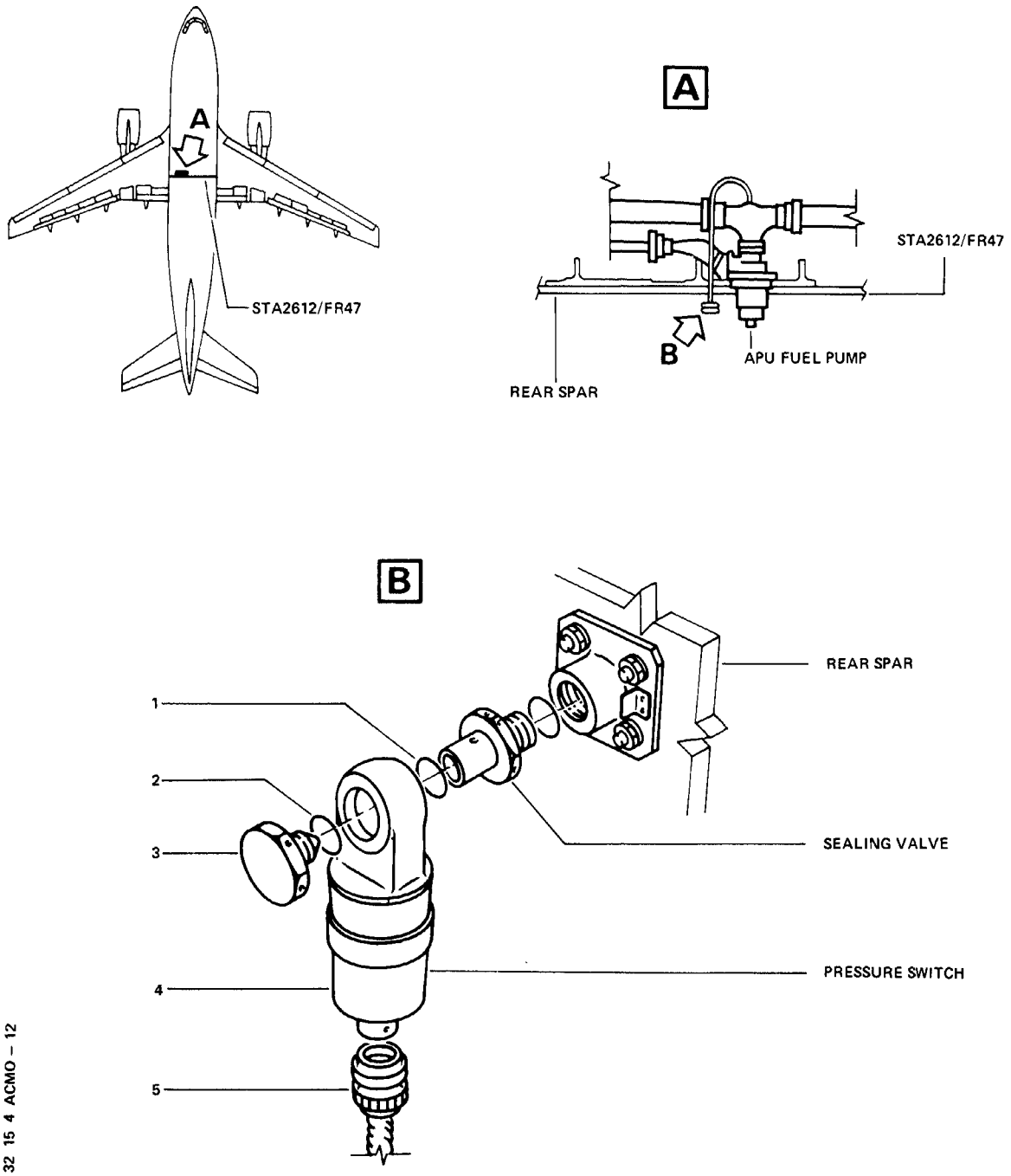
(6)Install a container under APU fuel pump pressure switch 15QC.

B. Removal
(Ref. Fig. 401)
(1)Disconnect electrical connector (5) from pressure switch.
(2)Cut and remove lockwire and remove threaded plug (3).
NOTE : Sealing valve closes automatically as threaded plug (3) is removed.
(3)Remove pressure switch (4) and the two O-rings (1) and (2).
(4)Cap sealing valve.

C. Preparation of Replacement Component
(1)Depreserve replacement component.
(2)Clean and inspect pressure switch (4) interface and/or adjacent area.

D. Installation
(1)Remove blanking plug/cap from sealing valve.
(2)Smear new O-rings (1) and (2) with fuel or Material No.04-012.
(3)Install O-ring (1) on sealing valve and install pressure switch, making certain that O-ring is correctly positioned.
(4)Install O-ring (2) in the groove of pressure switch.
(5)Install threaded plug (3) on pressure switch, tighten and wirelock.
(6)Connect electrical connector (5) to pressure switch.

E. Test
(1)Make certain that no other maintenance procedures are being carried out



APU Fuel Pump Pressure Switch
Figure 401

on the fuel system.
(2)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.
(3)Close circuit breakers 50KA, 2KD, 1QC, 10QC and 11QC.
(4)On overhead panel make certain that APU FIRE handle is pushed in.
(5)On the APU section of panel 429VU, select APU system to following configuration :
(a)MASTER SW in ON position
(b)FUEL PUMP pushbutton switch pressed (in) (OVRD legend off).
(6)On mechanical center pedestal 9VU, make certain that ENG1 HP fuel shutoff valve control lever is in OFF position.
(7)Start up a left inner tank pump (Ref. 28-21-00, P. Block 501). With fuel feed system pressurized, aurally check that APU fuel pump is no longer operating (in zone 147).
(8)Check APU fuel pump pressure switch 15QC for leakage.
(9)Shut down left inner tank pump (Ref. 28-21-00, P. Block 501).
(10)On APU section of panel 429VU, place MASTER SW in OFF position.

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Close left main landing gear door (Ref. 32-12-11, P. Block 301).
(4)Remove warning notices.
(5)Make certain that circuit breakers 50KA, 1QC, 10QC, 11QC and 2KD are closed.
(6)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(7)Remove all ground handling and maintenance equipment, standard and special tools, together with ground power and replenishing equipment, all access equipment and miscellaneous items.

DIFFERENTIAL PRESSURE INDICATOR REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Blanking Caps
D.	Corrosion-Resistant Steel Lockwire 0.6 mm (0.024 in.) dia.
E.	O-Rings
F.	Container, 2 l (0.52 US gal.) Capacity
G.	Torque Wrench, up to 150 lbf.in. (1.7 m.daN)
H. 98A28007570000	Adapter - Vent and Drain Valve, APU
J. Material No. 04-505	Common Grease (Ref. Consumable Material List, Part 2).

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant

2. Procedure

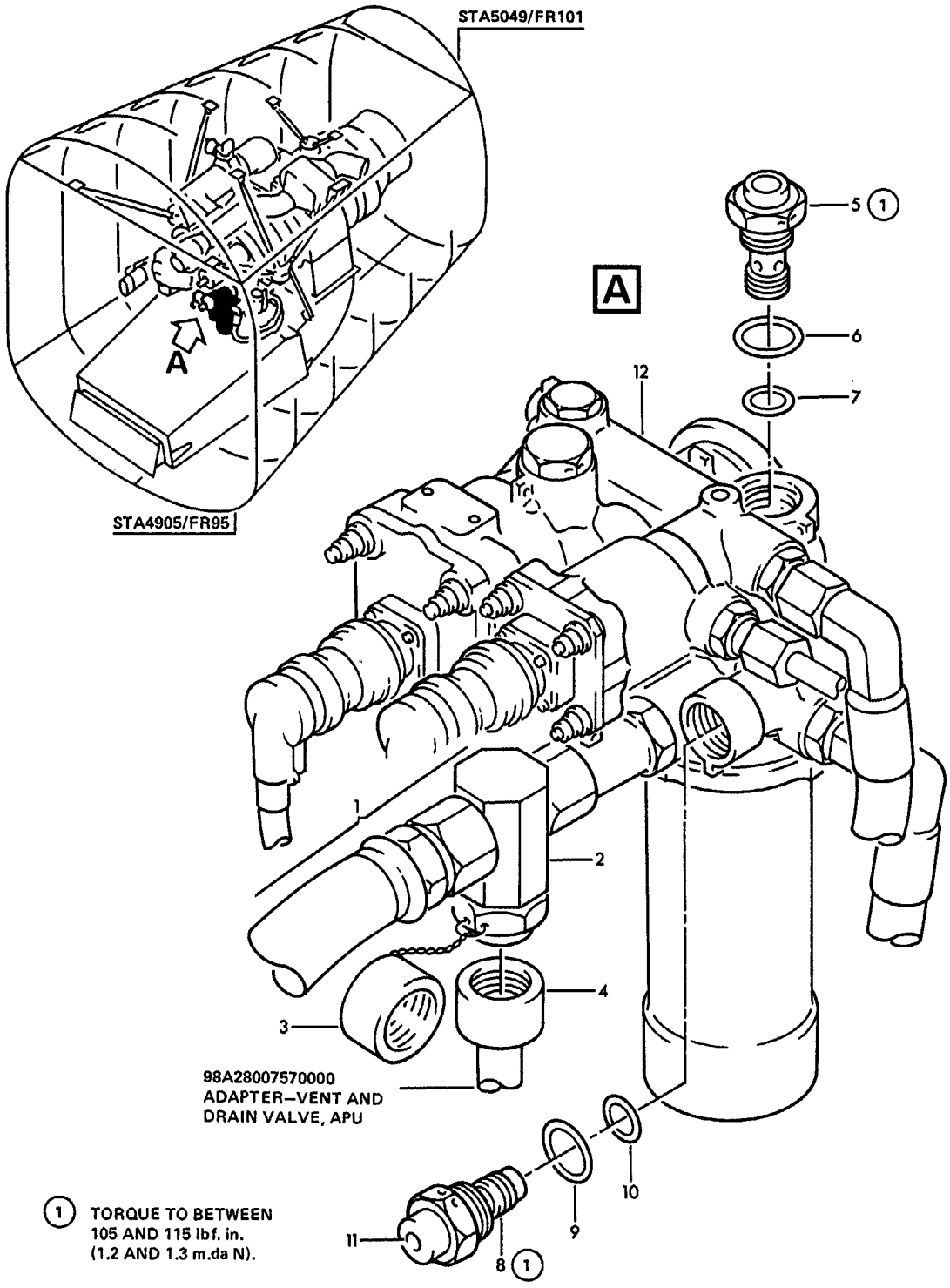
A. Job Set-Up
(Ref. Fig. 401)

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(1)Make certain that the APU Master SW, controlling APU pump and APU isolation (shutoff) valve, is in OFF position.

(2)Open, safety and tag the following circuit breakers.

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63



Differential Pressure Indicator
Figure 401

(3)Position access platform and open access doors 315AL and 316AR.
(4)Drain fuel feed line assy (1), using vent and drain valve adapter.
(a)Position container, 2 l (0.53 US gal.) capacity, below fuel feed line vent and drain valve port (2).
(b)Direct drain hose of vent and drain valve adapter (4) into container.
(c)Remove cap (3) from fuel feed line vent and drain valve port (2).
(d)Install vent and drain valve adapter (4) to fuel feed line vent and drain valve port (2).
(e)After draining remove vent and drain valve adapter (4) from fuel feed line vent and drain valve port (2).
(f)Install cap (3) to fuel feed line vent and drain valve port (2).

B. Removal
(1)Removal of fuel filter by-pass valve
(a)Cut and remove lockwire from fuel filter by-pass valve (5).
(b)Remove fuel filter by-pass valve (5) from Fuel Control Unit (FCU) (12).
(c)Remove and discard O-rings (6, 7).
(d)Install blanking caps.
(2)Removal of differential pressure valve indicator
(a)Cut and remove lockwire from differential pressure valve indicator (8).
(b)Remove differential pressure valve indicator (8) from FCU (12).
(c)Remove and discard O-rings (9, 10).
(d)Install blanking caps.

C. Preparation for Installation
(1)Inspect filter by-pass valve (5) for damage. Replace if necessary.
(2)Inspect differential pressure valve (8) for damage. Replace if necessary.
(3)Apply grease (Mat. No. 04-505) to new O-rings (6, 7, 9, 10).
(4)Install new O-rings (6, 7) to fuel filter by-pass valve (5).
(5)Install new O-rings (9, 10) to differential pressure valve indicator (8).

D. Installation
(1)Installation of fuel filter by-pass valve
(a)Remove blanking caps.
(b)Install fuel filter by-pass valve (5) to FCU (12).
(c)TORQUE to between 105 and 115 lbf.in. (1.2 and 1.3 m.daN).
(d)Safety fuel filter by-pass valve (5) with lockwire.
(2)Installation of differential pressure indicator
(a)Remove blanking caps.
(b)Install differential pressure indicator (8) to FCU (12).
(c)TORQUE to between 105 and 115 lbf.in. (1.2 and 1.3 m.daN).
(d)Safety differential pressure indicator (8) with lockwire.
NOTE : Make certain, that the indicator pop (11) is not protruding.

E. Functional Test
(1)Remove container.
(2)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 71KD, 10QC, 11QC and 1QF.
(3)Start and operate APU with no load (Ref. 49-10-00 P. Block 501).
(4)Check all fuel connections for fuel leaks.
NOTE : Leaks are not permissible.
(5)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

1. Equipment and Materials

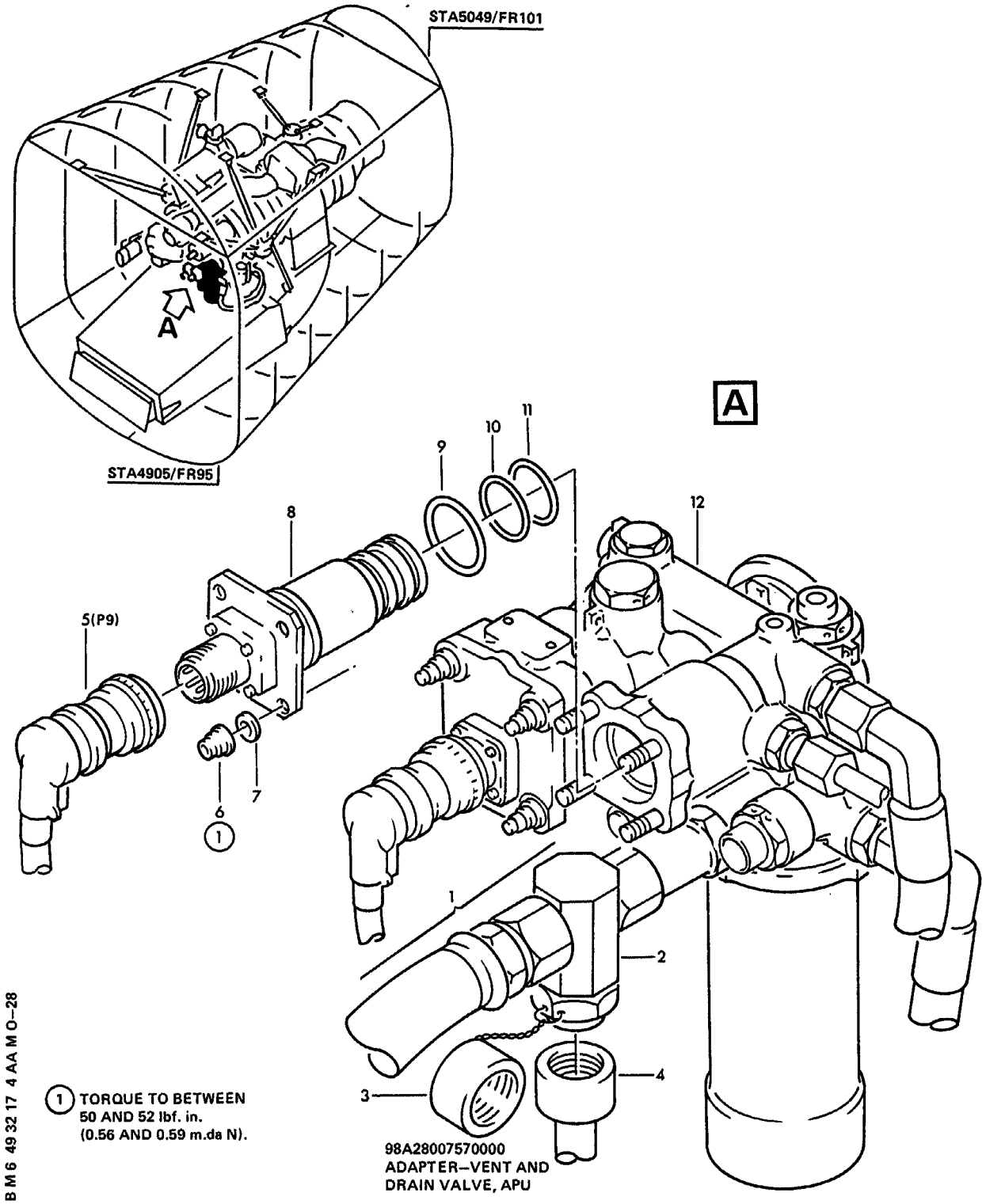
ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Blanking Caps
D.	Corrosion-Resistant Steel Lockwire 0.032 in. (0.8 mm) dia.
E.	O-Rings
F.	Container 2 l (0.52 US gal.) Capacity
G.	Torque Wrench, up to 150 lbf.in. (1.7 m.daN)
H. 98A28007570000	Adapter - Vent and Drain Valve, APU
J. Matrial No. 04-505	Common Grease (Ref. Consumable Material List, Part 2)
Referenced Procedures	
- 49-10-00, P. Block 501	Power Plant

2. Procedure

A. Job Set-Up
(Ref. Fig. 401)
CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.
(1)Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63



Fuel Solenoid Valve
Figure 401

(3)Position access platform and open access doors 315AL and 316AR.
(4)Drain fuel feed line assy (1) , using vent and drain valve adapter.
(a)Position container, 2.0 l (0.53 US gal) capacity, below fuel feed line vent and drain valve port (2).
(b)Direct drain hose of vent and drain valve adapter (4) into container.
(c)Remove cap (3) from fuel feed line vent and drain valve port (2).
(d)Install vent and drain valve adapter (4) to fuel feed line vent and drain valve port (2).
(e)After draining remove vent and drain valve adapter (4) from fuel feed line vent and drain valve port (2).
(f)Install cap (3) to fuel feed line vent and drain valve port (2).

B. Removal
(1)Cut and remove lockwire from electrical connector P9 (5).
(a)Remove electrical connector P9 (5) from fuel solenoid valve (8) and fit blanking caps.
(2)Remove nuts (6) and washers (7).
(3)Remove fuel solenoid valve (8) from fuel control assembly (12).
(4)Remove and discard O-rings (9, 10, 11) from fuel solenoid valve (8).

C. Installation
(1)Apply grease (Mat. No. 004-505) to new O-rings (9, 10, 11) and install to fuel solenoid valve (8).
(2)Position fuel solenoid valve (8) to fuel control assembly (12).
(3)Install washers (7), nuts (6).
(a)TORQUE nuts (6) to between 50-52 lbf.in. (0.56-0.59 m.daN).
(4)Connect electrical connector P9(5) to fuel solenoid valve (8).
(a)Safety electrical connector P9(5) with lockwire.
(5)Remove container.

D. Functional Test
(1)Remove safety clips and tags, and close circuit breakers 50KA, 1KD, 71KD, 10QC, 11QC and 1QF.
(2)Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
(3)Check all fuel connections for fuel leaks.
NOTE : Leaks are not permissible.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

R APU ISOLATION VALVE (11QF) - REMOVAL/INSTALLATION
R

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

MAKE CERTAIN THAT LANDING GEAR GROUND SAFETIES INCLUDING CHOCKS, ARE IN POSITION.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platforms 2.50 m (8 ft. 4 in.) 4.80 m (15 ft. 8 in.)
B.	Containers
C.	Blanking Plugs/Caps
D. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-00-00, P. Block 301	Fuel
- 28-22-00, P. Block 301	Tank Isolation System
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

2. Procedure

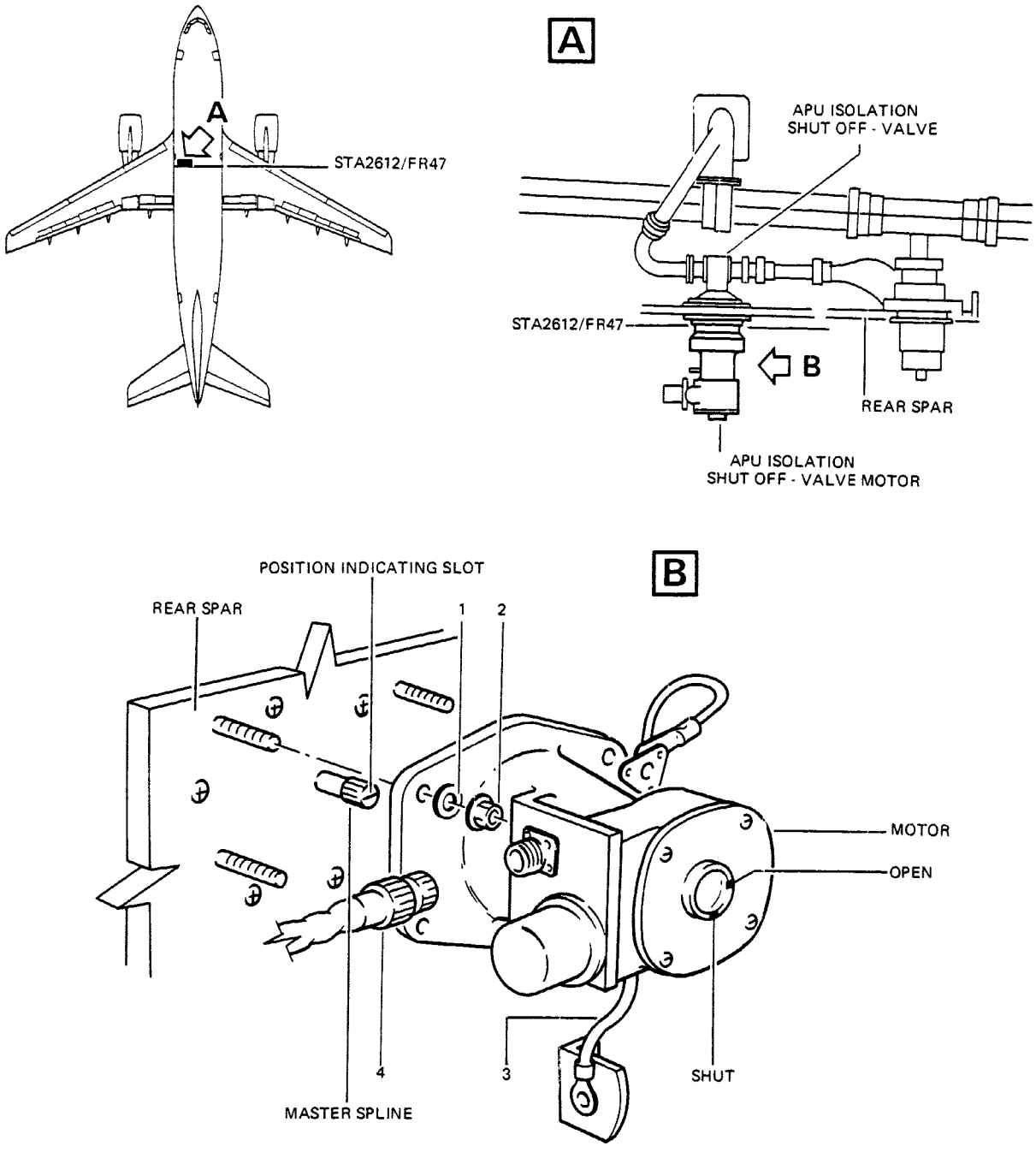
A. Job Set-Up
(1) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics rack ventilation is correct.
(2) Drain or transfer fuel contained in center tank (Ref. 28-22-00, P. Block 301).
(3) Make certain aircraft is in the following configuration :
(a) On FUEL section of panel 430VU
1 Release left wing INR TK and OUTR TK/ISOL VALVES pushbutton switches to close associated isolation valves : OFF legends on.
2 Make certain that X FEED pushbutton switch is released (out) (crossfeed valve closed) : pushbutton switch flowbar is cross line.
3 Display warning notices on ISOL VALVES and XFEED valve pushbutton switches prohibiting their operation.
(b) On APU section of panel 429VU
1 Make certain that MASTER SW is in OFF position.
2 Display a warning notice prohibiting operation of MASTER SW

(4)Open, safety and tag the following circuit breakers :

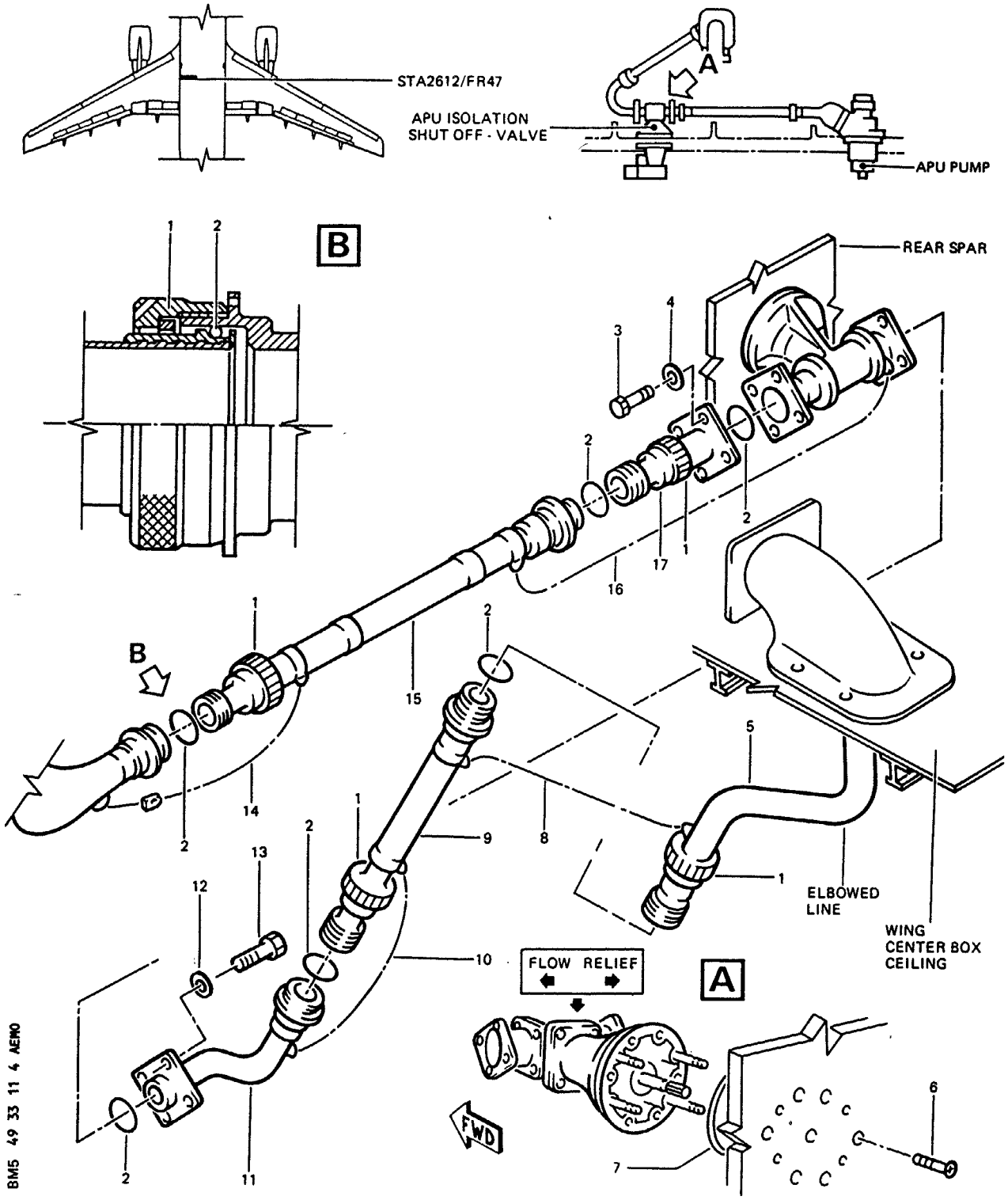
PANEL	SERVICE	IDENT.	LOCATION
132VU	OUTR TK/L ISOL/VALVE	1QB	324/L55
132VU	INR TK/L ISOL/VALVE	3QB	324/L57
132VU	X FEED VALVE/MOTOR 2	1QE	324/L61
132VU	X FEED VALVE/MOTOR 1	2QE	324/L60
131VU	APU/START	5OKA	317/B54
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63

(5)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(6)Open left main landing gear door (Ref. 32-12-11, P. Block 301).
(7)Position access platform.
(8)Remove access door 147AZ.
(9)Place containers in wing center box, under APU isolation valve.

B. Removal
(1)Removal of APU isolation valve actuator
(Ref. Fig. 401)
(a)Disconnect electrical connector (4) from APU isolation valve actuator.
(b)Disconnect bonding lead (3) from actuator ground connector.
(c)Remove the four nuts (2) and washers (1).
(d)Remove APU isolation valve actuator.
(2)Removal of APU isolation valve
(Ref. Fig. 402)
WARNING : BEFORE UNDERTAKING MAINTENANCE OPERATIONS INSIDE A FUEL TANK, THE PRESCRIBED SAFETY PRECAUTIONS MUST BE RIGOROUSLY OBSERVED (REF. 28-00-00, P. BLOCK 301).
(a)Disconnect :
- bonding lead (8) from elbow line (5)
- bonding lead (10) from elbow union (11)
- bonding lead (16) from isolation valve ground lug
- bonding lead (14) from APU pump outlet line.
(b)Remove the four union nuts (1).
(c)Remove the four bolts (13) and washers (12).
(d)Disconnect elbow union (11) from isolation valve and from line (9). Recover any fuel remaining in lines.
(e)Remove line (9).
(f)Remove the four bolts (3) and washers (4).
(g)Push union (17) and line (15) fully home, one inside the other, into APU pump line outlet. Support the assembly in this position in order to disengage union (17) from APU isolation valve. Recover any fuel remaining in lines.
(h)Remove the six countersunk screws (6).
(j)Remove APU isolation valve.
(k)Disconnect union (17) and line (15).



Removal of APU Isolation Valve Actuator
Figure 401



Removal of APU Isolation Valve
Figure 402

(l)Remove containers from center tank.
(m)Cap pump outlet line and elbow line.

C. Preparation of Replacement Component
(1)Depreserve replacement component.
(2)Clean and inspect component interface and/or adjacent area.

D. Preparation of Lines
(1)Remove O-rings (2) from elbow line (5), lines (15) and (9), from elbow union (11) and union (17).
(2)Clean and check for correct condition of lines and line ends.
(3)Install a new O-ring (2) in the groove of line ends and unions.
(4)Smear line ends and O-rings with fuel or Material No. 04-012.
(5)Remove blanking plugs/caps.

E. Installation
(1)Installation of APU isolation valve
(a)Install line (15) on APU pump outlet. Tighten the appropriate union nut (1).
(b)Install union (17) on line (15). Tighten the appropriate union nut.
(c)Push line (15) fully into pump outlet and union (17) into line (15). Support line in this position.
(d)Install APU isolation valve on the front face of rear spar, making certain that the new O-ring (7) is correctly positioned in the groove of valve mounting base.
NOTE : The correct position for mounting the valve is indicated by the "RELIEF" and "FLOW" arrows marked on the valve body.
(e)Install the six screws (6) and tighten in diametrically opposed sequence.
(f)Assemble union (17) and isolation valve, making certain that O-ring (2) is correctly positioned on the end of union (17).
Install the four bolts (3) complete with their washers (4). Tighten bolts.
(g)Install line (9) on elbow line (5) and tighten the appropriate union nut (1).
(h)Install elbow union (11) on line (9) and on isolation valve, making certain that O-ring (2) is correctly positioned on the end of elbow union (11).
(j)Install the four bolts (13) complete with their washers (12). Tighten bolts.
(k)Tighten union nut (1) on elbow union (11).
(l)Connect bonding leads (8), (10), (16) and (14) respectively to : elbow line, elbow union (11), isolation valve and APU pump outlet.
(2)Installation of APU isolation valve actuator
(a)Position slot of valve splined control shaft in configuration corresponding to that indicated by index on valve actuator. (Slot vertical : valve closed ; slot horizontal : valve open).
NOTE : Master splines on both valve splined control shaft and actuator splined hub prevent defective connection of valve/actuator assembly.
(b)Position actuator on its four attachment bolts, (with electrical

connector on left side). Push actuator fully home on bolts.
(c)Install washers (1) and nuts (2). Tighten nuts.
(d)Connect bonding lead (3) to actuator ground connector.
(e)Connect electrical connector (4) of isolation valve actuator.

F. Test
(1)Make certain that no other maintenance operations are being carried out on the fuel system.
(2)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics rack ventilation is correct.
(3)Remove safety clips and tags and close circuit breakers 1QB, 3QB, 1QE, 2QE, 50KA, 1QC, 11QC, 10QC and 1QF.
(4)In flight compartment
(a)On FUEL section of panel 430VU
- press left wing INR TK and OUTR TK/ISOL VALVES pushbutton switches to open associated isolation valves : flowbars on pushbutton switches are on.
(b)On mechanical center pedestal 9VU
- make certain that ENG1 HP fuel shut off valve control lever is in OFF position.
(5)Open, safety and tag the following circuit breakers :

131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FIRE EXTING/SQUIB/TEST	7WF	318/A60

(6)On APU FIRE control module 20WG located on overhead panel
- close APU low pressure valve by pulling APU FIRE handle.
(7)Start up one pump of left inner tank by pressing associated INR TK PUMP pushbutton switch.
(8)Position access platform at zone 315 (316).
(9)Open doors 315AL and 316AR of APU compartment.
(10)Operate APU isolation valve using pushbutton switch 12QC located in APU compartment (STA4905/FR95) making certain that for the open/close position of switch, index on actuator is in corresponding configuration.
(11)With fuel system pressurized and isolation valve open, check removed portion of the system for leakage.
(12)Shut down left inner tank pump by releasing associated INR TK PUMP pushbutton switch (OFF legend on).
(13)Close doors 315AL and 316AR of APU compartment.

G. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 147AZ.
(3)Remove access platform.
(4)Close left main landing gear door (Ref. 32-12-11, P. Block 301).
(5)Remove warning notices.
(6)On APU FIRE control module 20WG located on overhead panel
- open APU low pressure valve by pushing APU FIRE handle. Lead seal handle.
(7)Remove safety clips and tags and close circuit breakers 1WF, 2WF and

7WF.

(8) On APU section of panel 429VU, make certain that MASTER SW is in OFF position.

(9) De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(10) Remove all ground handling and maintenance equipment, standard and special tools, together with ground power equipment, all access equipment and miscellaneous items.

APU ISOLATION VALVE DEACTIVATION/REACTIVATION

WARNING : LANDING GEAR - MAKE CERTAIN GROUND SAFETIES AND CHOCKS ARE IN POSITION.

WARNING : FLIGHT CONTROLS - MAKE CERTAIN GROUND SAFETIES AND NOTICES ARE IN POSITION.

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MMEL.

1. Reason for Job

A. Ref. MMEL Section 1-49, Item 2. Isolation valve may be inoperative in the closed position (Refer also to MMEL 49, Item 1 for ER operation)

2. Equipment and Material

ITEM	DESIGNATION
(1)	Access Platform 2.50 m (8 ft.)
(2)D97B00-001	Actuator - Mechanical
(3)	Circuit Breaker Safety Clips and Tags
(4)	Warning Notice
(5)	Lockwire, Corrosion Resistant Steel 0.8 mm (0.032 in).

Referenced Procedures

- 20-28-11, P. Block 1	Electrical Bonding
- 32-12-11, P. Block 301	Main Gear Main Door
- 49-33-11, P. Block 401	APU Isolation Valve

3. Procedure

(Ref. Fig. 901)

A. Job Set-Up

CAUTION : ISOLATION VALVES MUST NOT BE SUBJECTED TO INTERMITTENT OPERATION FOR MORE THAN 30 SECONDS. ALLOW MOTORS TO COOL AFTER SEVERAL OPERATIONS.

(1)Make certain that the APU Master SW controlling APU pump and APU isolation (shutoff) valve is in OFF position.

(a)Position Warning Notice on APU MASTER SW.

(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL ISOL VALVE/CTL	3WF	B62
131VU	APU/FUEL ISOL VALVE/SUPPLY	1QF	B63

(3)Open LH main landing gear door 734 (Ref. 32-12-11, P. Block 301).
(4)Position access platform.
(5)Remove access panel 147EZ.

B. Deactivation

R NOTE : Different types of actuators may be installed therefore
R visual indicator or electrical connector installation
R will be different, but installation details are similar.
R (1)Disconnect electrical connector (1) from the APU isolation valve
R actuator.
R (2)Install blanking plugs/caps on electrical connector and receptacle.
R (3)Stow and secure with adhesive tape electrical connector.
R (4)Check visual indicator to make certain that the APU isolation
R valve is in CLOSED position.
R (5)If the valve is not in the CLOSED position:

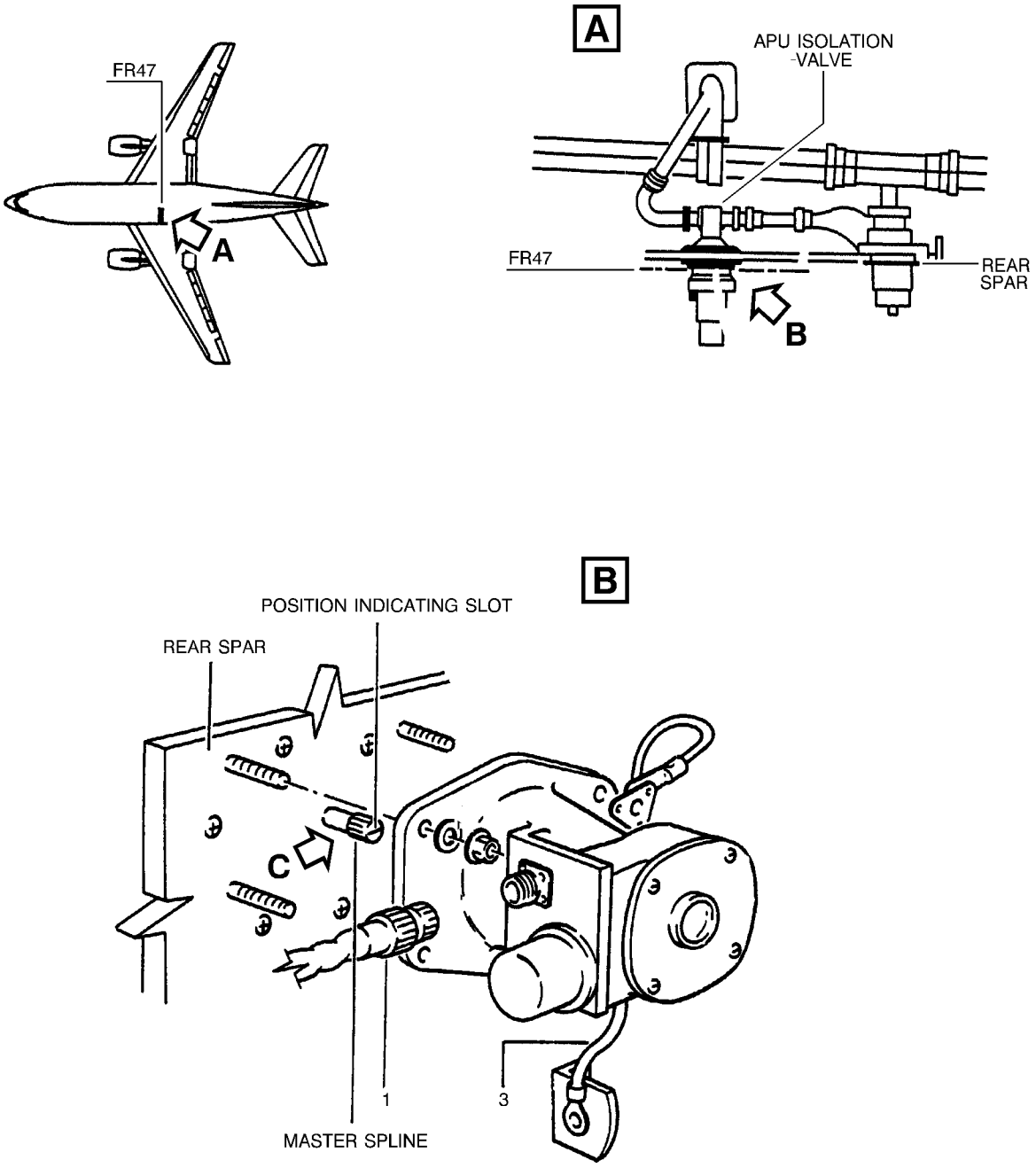
R (a)Remove the APU isolation valve actuator from the APU isolation valve (Ref. 49-33-11, P. Block 401).

CAUTION : WHEN YOU DO THE OPERATION THAT FOLLOW, MAKE SURE THAT YOU DO NOT DAMAGE THE SPLINES ON THE SHAFT OF THE VALVE.

R (b)Install the mechanical actuator PN D97B00-001 onto the valve with the nuts (3).
R (c)Manually operate the control-lever on the mechanical actuator to turn the shaft of the valve to the SHUT position (Ref. Fig. 901) (Sheet 2 of 2).
R (d)Safety the control-lever on the mechanical actuator with lockwire.
R (e)Attach the bonding strap (4) to the bonding tag on the mechanical actuator with the bolt (5), the washer (6) and the nut (7) (Ref. 20-28-11, P. Block 1).

C. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access panel 147EZ.
(3)Remove access platform.
(4)Close LH main landing gear door 734 (Ref. 32-12-11, P. Block 301).
(5)Install a temporary placard in the flight compartment to warn the flight crew that APU isolation valve is deactivated.
(6)Make an entry in the aircraft technical log book.

D. Reactivation
(1)Remove the mechanical actuator PN D97B00-001, if installed.
(2)Trouble shoot to identify cause of APU isolation valve malfunction



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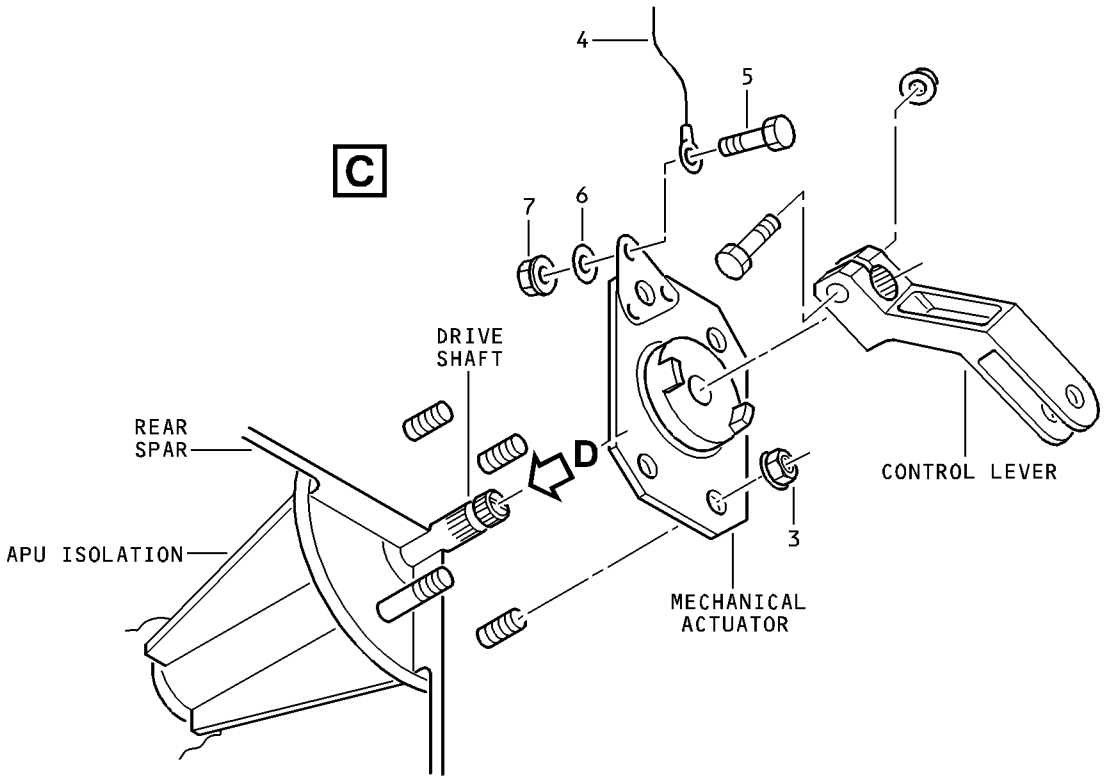
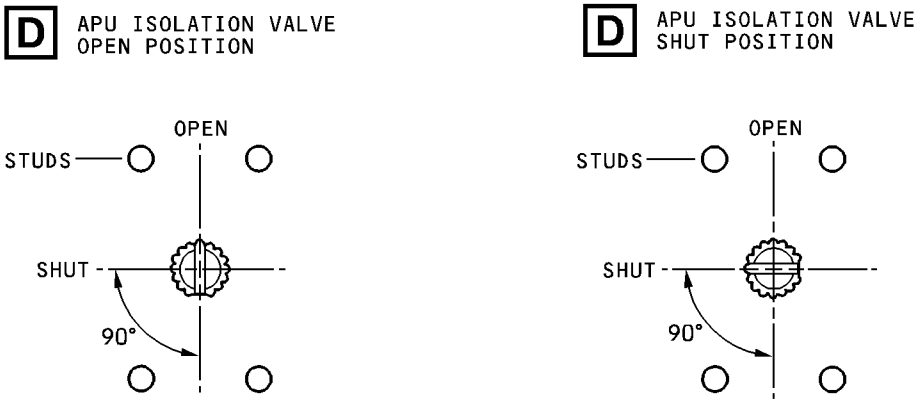
APU Isolation Valve Actuator (Sheet 1 of 2)
Figure 901

R





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APU Isolation Valve Actuator (Sheet 2 of 2)
Figure 901

R

and replace defective component as follows:
(a)Valve fault - replace valve (Ref. 49-33-11, P. Block 401).
(b)Actuator fault - replace actuator (Ref. 49-33-11, P. Block 401).
(3)Remove temporary placard from flight compartment.
(4)Make an appropriate entry in the aircraft technical log.

R LOW PRESSURE VALVE (12QF) - REMOVAL/INSTALLATION
R

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROL OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.
BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
BEFORE PRESSURIZING FUEL SYSTEMS, MAKE CERTAIN THAT FUEL SYSTEM UNDER MAINTENANCE HAS BEEN ISOLATED.
CHECK THAT LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.
BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Reason for the Job

A. Removal/Installation of low pressure valve

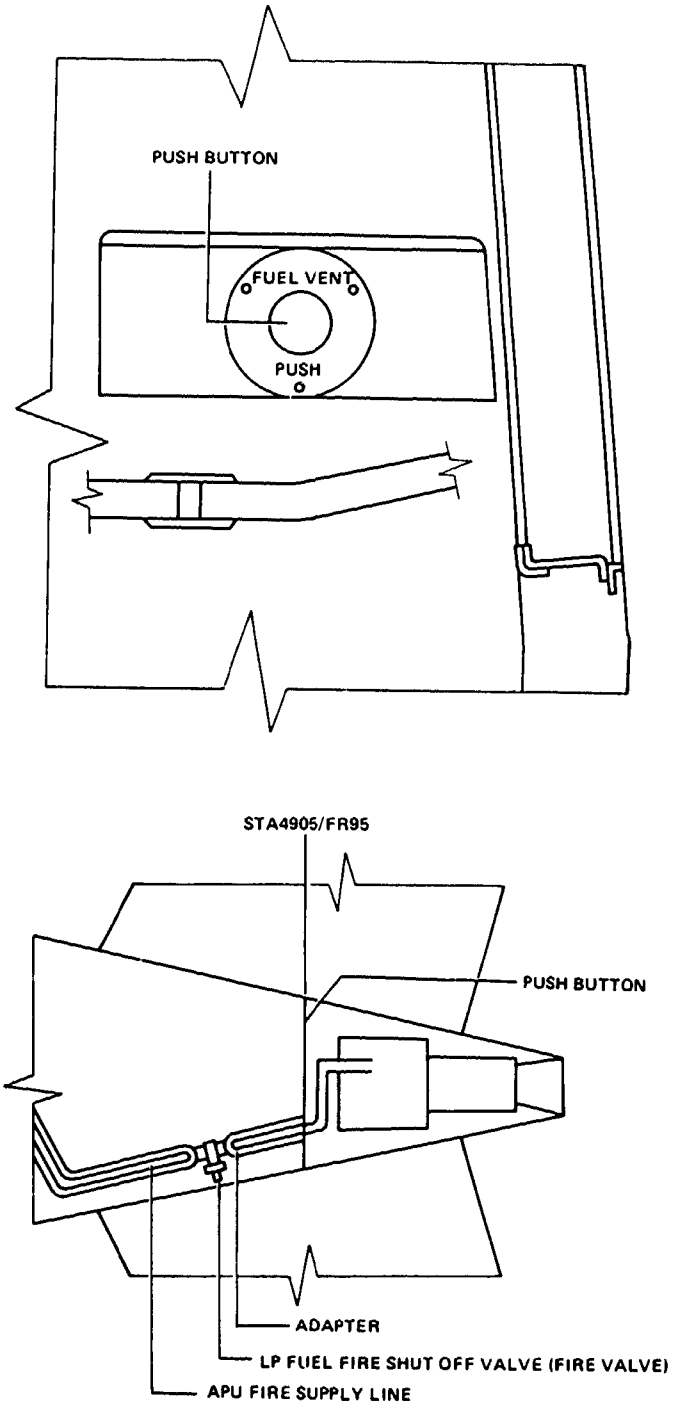
2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6.5 m (21 ft. 5 in.)
B.	Containers
C.	Blanking Plugs/Caps
D.	Drain Hose
E.	O-Rings
F. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-21-00, P. Block 1	Fuel Pump System

3. Procedure
(Ref. Fig. 401)

Controls and Circuit Breakers

A. Job Set-Up
(1) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.
(2) On APU section of panel 429VU, make certain that MASTER SW is in OFF position. On APU section of maintenance panel 472VU, SHUT legend of ISOL VALVE annunciator comes on.
(3) On overhead panel, make certain that APU FIRE handle is pushed (valve open).
(4) Display a warning notice on APU FIRE handle and on MASTER SW (on panel 429VU) prohibiting their operation.
(5) Open, safety and tag the following circuit breakers :



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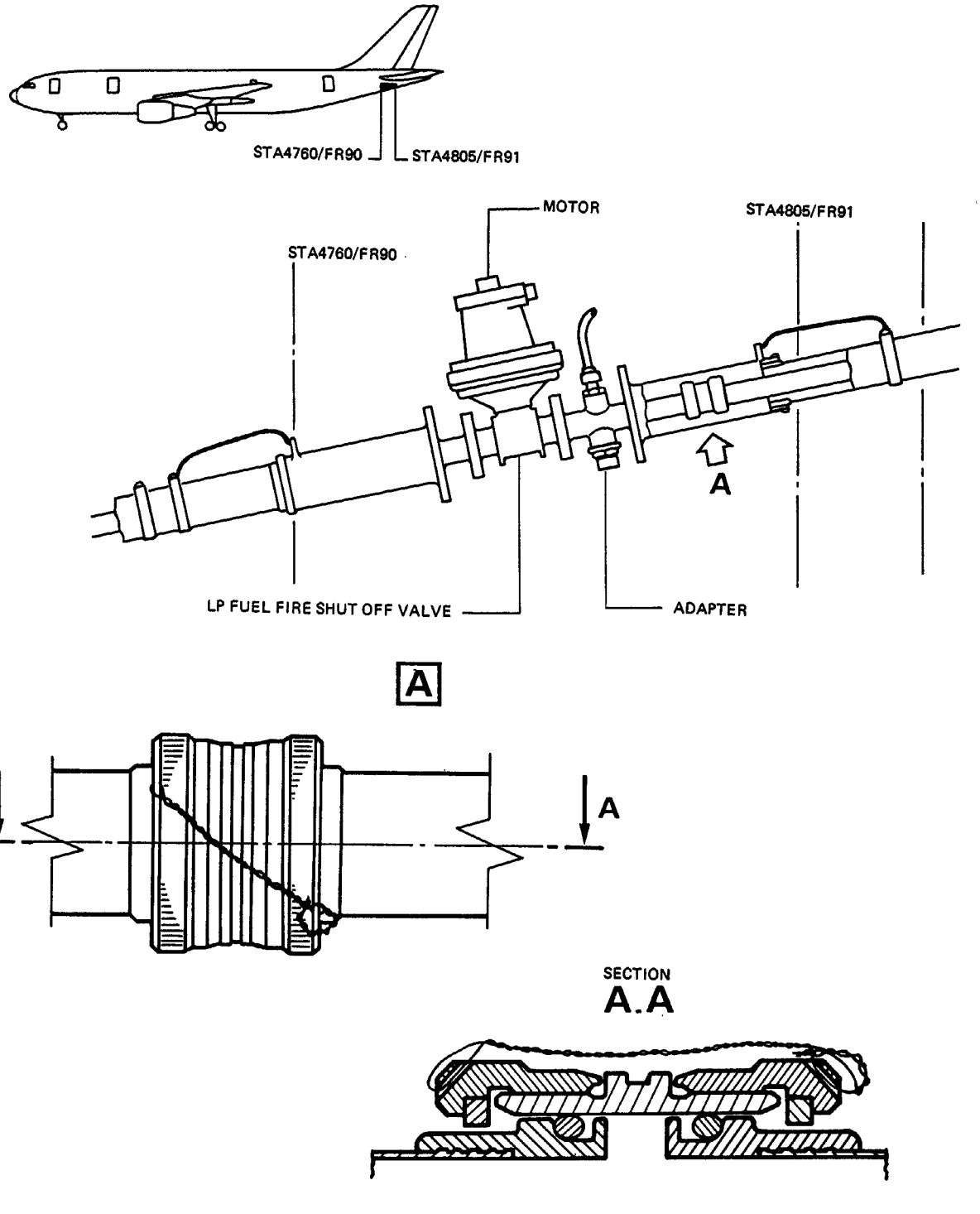
Low Pressure Valve - Location of Access Doors,
Figure 401

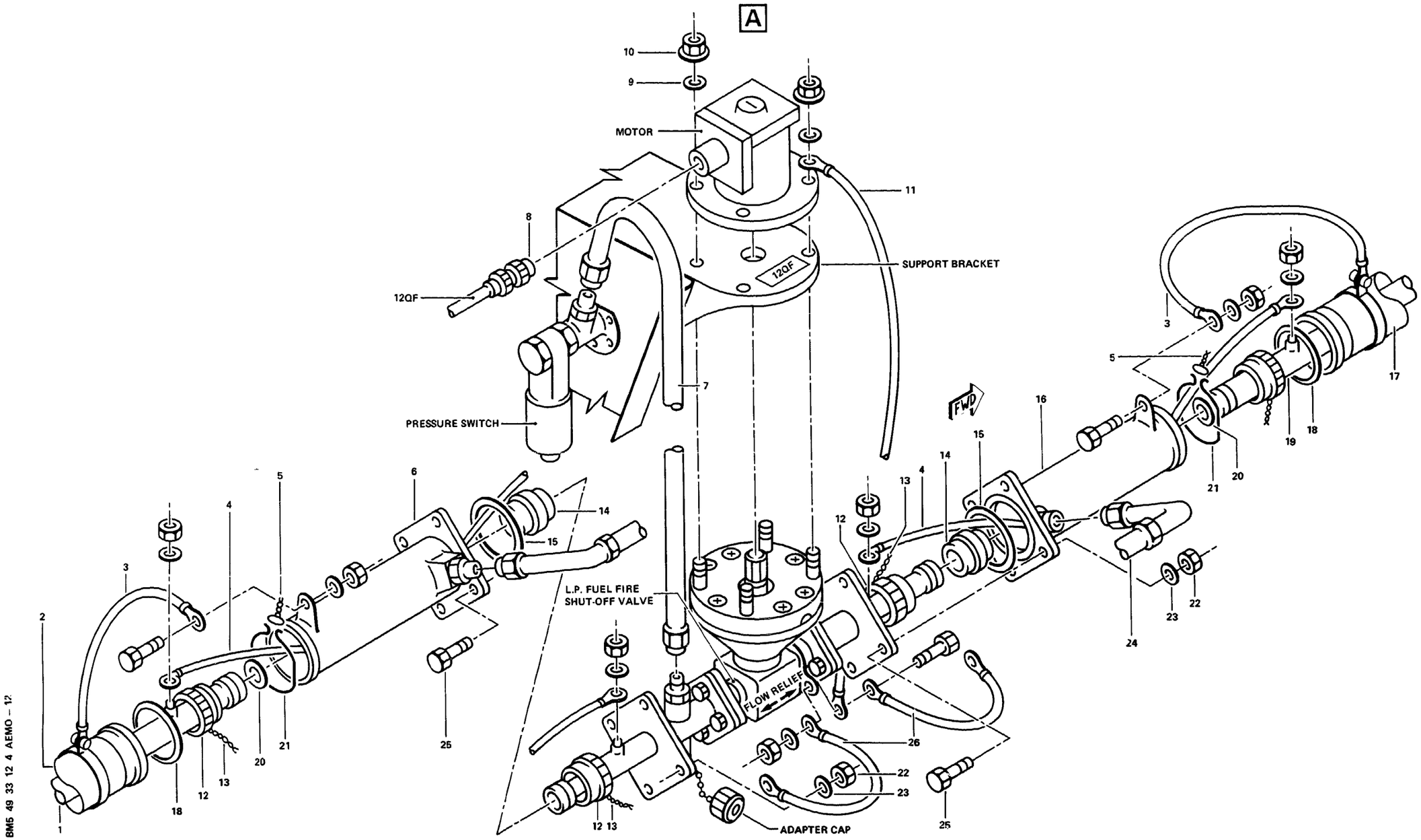
PANEL	SERVICE	IDENT.	LOCATION
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52
131VU	APU/START	50KA	317/B54
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FUEL ISOL/VALVE/CTL	3WF	317/B62
131VU	FUEL LP/VALVE/CTL	4WF	318/A62
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63

(6)Position access platform.
(7)Open APU compartment access doors 313AL, 315AL and 316AR.
(8)Display a warning notice on FUEL VENT pushbutton switch located on APU compartment firewall prohibiting its operation.
(9)Position container under LP valve.
(10)Remove adapter cap and install drain hose. Recover fuel contained in hose.
NOTE : Adapter opens automatically when drain hose is installed.
(11)Remove drain hose.

B. Removal
(1)Removal of low pressure valve
(Ref. Fig. 402)
(Ref. Fig. 403)
(a)Disconnect electrical connector (8) from low pressure valve actuator.
(b)Remove the two bonding strips (3) from sleeves (6) and (16).
(c)Disconnect pressure tapping line (7) from pressure switch and valve flanged connector.
(d)Disconnect crossfeed line (24) from sleeves (6) and (16).
(e)Remove the four nuts (22), four washers (23) and the four bolts (25) securing each of the sleeves (6) and (16) to valve flanged connectors.
(f)Slide sleeve (6) along line (2) and sleeve (16) along line (17) to disengage fuel line connectors (1) and (19).
(g)Disconnect the two bonding strips (4).
(h)Cut and remove lockwire (13). Loosen the four union nuts (12).
(i)Disconnect lines (1) and (19) from valve flanged connector by sliding connector sleeves (14) along lines (1) and (19) drain and recover fuel contained in valve.
NOTE : Prevent fuel from flowing into double wall line (17) and (19) assembly.
(j)Support valve and remove the four nuts (10) and four washers (9). Disconnect bonding strip (11).
(k)Remove actuator and valve assembly.
(l)Remove the two sleeves (14).
(m)Cut and remove lockwire (5). Remove retaining clips (21) and then the two sleeves (6) and (16).
(n)Cap open line ends.



LP Valve - Location
Figure 402



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Low Pressure Valve - Removal
Figure 403

(p)Remove containers.

(2)Removal of valve components
(Ref. Fig. 404)

(a)Disconnect bonding strips (11) and (26).

(b)Remove the four bolts (28) and four washers (29) securing each of the flanged connectors (27) and (33) to valve. Disconnect connectors.

(c)Remove the six bolts (32) and then flange (31).

C. Preparation of Replacement Component

(1)Preparation of valve
(Ref. Fig. 404, 405)

R **ON A/C 004-200,

(a)Remove O-rings (30) and (34) from flanged connectors (27) and (33). Discard O-rings.

(b)Clean and check condition of flanged connectors and connector end fittings.

(c)Check adapter (drain valve) installed on flanged connector (27) for correct operation.

(d)Coat new O-rings (30) and (34) with hydraulic fluid or Material No. 04-012 and install in grooves in flanged connectors (27) and (33).

(e)Install flanged connector (27) on flow side of valve. Install washers (29) and bolts (28) and tighten bolts.

NOTE : Make certain that bonding strips on flanged connector (27) are installed perpendicular to valve centerline.

(f)Install flanged connector (33) on RELIEF side of valve. Install washers (29) and bolts (28). Tighten bolts.

NOTE : Make certain that bonding strips on flanged connector (33) are installed perpendicular to valve centerline.

(g)Install flange (31) with drain channel to the left with respect to fuel FLOW direction (indicated by an arrow on valve body) and then install the 6 bolts (32).

(h)Connect bonding strips (11) and (26) to valve.

(2)Preparation of lines (Ref. Fig. 403)

(a)Remove O-rings (15) from sleeves (6) and (16). Discard O-rings.

(b)Remove O-rings (18) from lines (2) and (17) and O-rings (20) from lines (1) and (19). Discard O-rings.

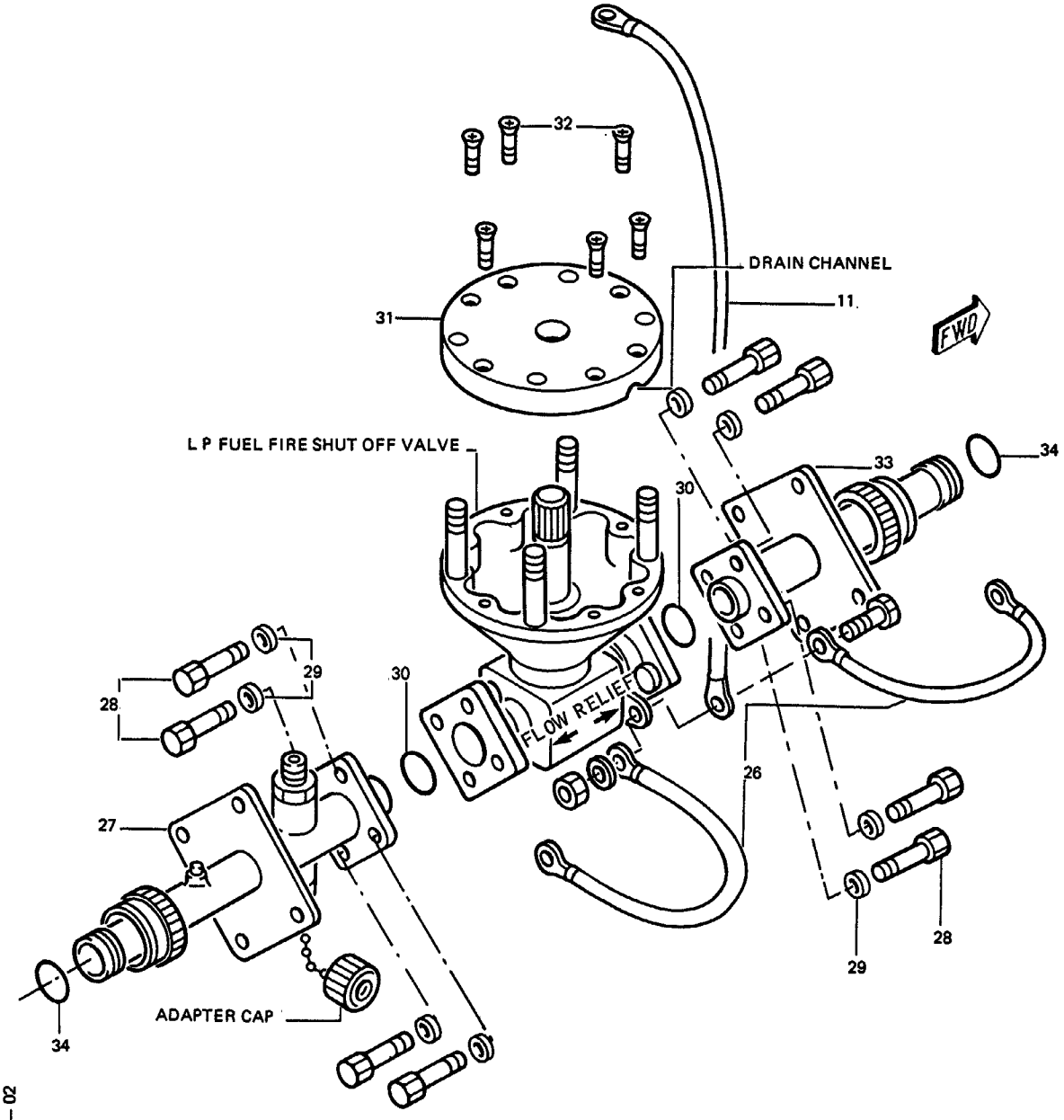
(c)Clean and check for condition of line ends, connectors (14) and sleeves (6) and (16).

(d)Install new O-rings (18) in grooves in line ends (2) and (17).
Install new O-rings (20) in grooves in line ends (1) and (19).

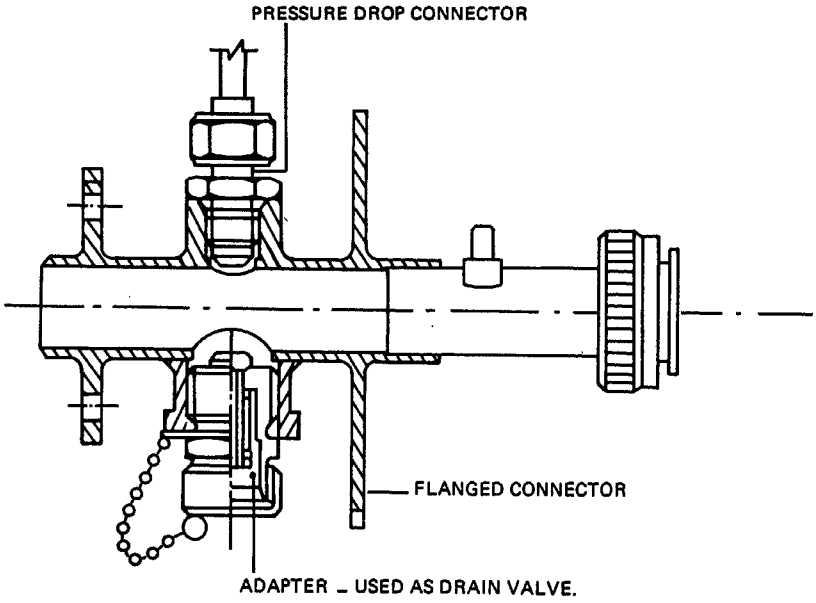
NOTE : Prior to O-ring installation, coat O-rings and grooves with hydraulic fluid or Material No. 04-012.

**ON A/C 001-003,

(a)Remove O-rings (30) and (34) from flanged connectors (27) and (33).



Low Pressure Valve - Components
Figure 404



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DM5

Flanged Connector/Adapter (Drain Valve) Assembly
Figure 405

Discard O-rings.
(b)Clean and check condition of flanged connectors and connector end fittings.
(c)Check adapter (drain valve) installed on flanged connector (27) for correct operation.
(d)Coat new O-rings (30) and (34) with hydraulic fluid or Material No. 04-012 and install in grooves in flanged connectors (27) and (33).
(e)Install flanged connector (27) on flow side of valve. Install washers (29) andbolts (28) and tighten bolts.
NOTE : Make certain that bonding strips on flanged connector (27) are installed perpendicular to valve centerline.
(f)Install flanged connector (33) on RELIEF side of valve. Install washers (29) and bolts (28). Tighten bolts.
NOTE : Make certain that bonding strips on flanged connector (33) are installed perpendicular to valve centerline.
(g)Install flange (31) with drain channel to the left with respect to fuel FLOW direction (indicated by an arrow on valve body) and then install the 6 bolts (32).
(h)Connect bonding strips (11) and (26) to valve.
(2)Preparation of lines (Ref. Fig. 403)
(a)Remove O-rings (15) from sleeves (6) and (16). Discard O-rings.
(b)Remove O-rings (18) from lines (2) and (17) and O-rings (20) from lines (1) and (19). Discard O-rings.
(c)Clean and check for condition of line ends, connectors (14) and sleeves (6) and (16).
(d)Install new O-rings (18) in grooves in line ends (2) and (17). Installnew O-rings (20) in grooves in line ends (1) and (19).
NOTE : Prior to O-ring installation, coat O-rings and grooves with hydraulic fluid or Material No. 04-012.
(3)Inspect the plastic conduit and electrical connector 12QF (8) (Ref. Fig. 403).
(a)Check if there are drain holes at lower points of the conduits.
(b)If there is no drain hole :
1 Determine the lowest point of the conduit.
2 Cut a hole with 6 mm (0.25 in.) diameter. Take care not to damage the wires enclosed by the conduit.
3 If water is present in the conduit, locally remove the conduit and check that the connector is not corroded.
4 If the connector and backshell are corroded, disconnect the respective connector and replace.
(c)If there are drain holes, no action is required.

**ON A/C ALL

D. Installation of Valve Assembly (Ref. Fig. 403)
(1)Install sleeves (6) and (16) with their O-rings (15) on respective lines.
(2)Fully engage and install retaining clips (21) and safety with lockwire (5).
(3)Install sleeves (14) on lines (1) and (19) and tighten nuts (12).
(4)Push sleeves (14) onto lines to position valve assembly.

(5)Hold valve and engage sleeves (14) on ends of valve flanged connectors (27), and (33), tighten nuts (12) and safety with lockwire (13).
(6)Position actuator on four attach studs and line up splined valve spindle with actuator coupling matching master splines.
NOTE : 1 - Valve position indicator must read OPEN.
2 - Fuel feed adapter must be facing aft.
3 - Master splines act as a foolproofing device.
(7)Install bonding strip, the four washers (9) and the four nuts (10). Tighten nuts.
(8)Install the two bonding strips (4).
(9)Bring sleeves (6) and (16) against valve flanged connectors, making certain that bonding strip lugs are facing upwards and that O-rings are correctly installed.
(10)Install the eight bolts (25), the two bonding strips (26), washers (23) and nuts (22). Tighten nuts.
(11)Install the two bonding strips (3) on sleeves (6) and (16).
(12)Install crossfeed line (24) on sleeves (6) and (16). Tighten nuts.
(13)Connect pressure tapping line (7) on pressure switch and flanged connector. Tighten nuts.
(14)Install electrical connector (8) on low pressure valve actuator receptacle.

E. Adjustment/Test
(1)Close circuit breakers 1QC, 10QC, 11QC, 50KA, 3WF, 4WF, 1QF and 2QF.
(2)Operate APU FIRE handle and make certain that for the &open and close positions, position indicated on valve actuator position indicator corresponds to actual position of actuator.
(3)Push APU FIRE handle (valve open).
(4)Install drain hose on adaptor (drain valve) of APU fuel feed system.
(5)Start up a left inner tank booster pump (Ref. 28-21-00, P. Block 1).
(6)Press FUEL VENT pushbutton switch located on APU compartment firewall. When air trapped in APU fuel feed system has been bled off and when fuel flows through drain hose, release FUEL VENT pushbutton switch.
(7)Remove drain hose and install cap on adapter.
(8)Shut down the left inner tank booster pump (Ref. 28-21-00, P. Block 1).
(9)Close circuit breakers 1WF and 2WF.

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove warning notices.
(3)Close access doors 313AL, 315AL and 316AR.
(4)Remove access platform.
(5)On Overhead panel, make certain APU FIRE handle is pushed. Lead seal handle.
(6)On APU section of panel 429VU, make certain MASTER SW is in OFF position.
(7)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301)

R LOW PRESSURE VALVE (12QF) - DEACTIVATION/REACTIVATION
R

1. Failure of Low Pressure Valve
Ref. MMEL Sect. 1-49, Item 12 (LP Valve)
WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROL OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.
BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
BEFORE PRESSURIZING FUEL SYSTEMS, MAKE CERTAIN THAT FUEL SYSTEM UNDER MAINTENANCE HAS BEEN ISOLATED.
CHECK THAT LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.
BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

A. Deactivation
(1)Reason for the job
Failure of low pressure valve in open position.
(2)Job set-up
(a)On APU section of panel 429VU, make certain that MASTER SW is in OFF position.
(b)On overhead panel, make certain that APU FIRE handle is pushed (valve open).
(c)Display a warning notice on APU FIRE handle and on MASTER SW (on panel 429VU) prohibiting their operation.
(d)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52
131VU	APU/START	5OKA	317/B54
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FUEL ISOL/VALVE/CTL	3WF	317/B62
131VU	FUEL LP/VALVE/CTL	4WF	318/A62
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63

(e)Position access platform.
(f)Open APU compartment access doors 313AL, 315AL and 316AR.
(g)Display a warning notice on FUEL VENT pushbutton switch located on APU compartment firewall prohibiting its operation.
(3)Procedure (Ref. Fig. 901)
(a)Disconnect connector 12QF (1). Fit blanking cap and secure connector with adhesive tape.
(b)Remove nuts (3), washers (2) and bonding strip (5).

(c)Lift valve actuator (4) clear of support bracket and valve.
(d)Using a locally manufactured suitable tool on splines of valve control rod, taking care not to damage splines, turn valve to closed position.
(e)Position actuator (with the electrical connector on the left side) and install washers and nuts. Connect bonding strip.

(4)Close-up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Remove warning notices.
(c)Close access doors 313AL, 315AL and 316AR.
(d)Remove access platform.
(e)On overhead panel, make certain APU FIRE handle is pushed.
(f)On APU section of panel 429VU, make certain MASTER SW is in OFF position.
(g)Install a temporary placard in flight compartment to warn the flight crew that APU LP valve is deactivated.
(i)Remove safety clips and tags and close circuit breakers.

B. Reactivation
(1)Job set-up
(a)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.
(b)On APU section of panel 429VU, make certain that MASTER SW is in OFF position.
(c)On overhead panel, make certain that APU FIRE handle is pushed (valve open).
(d)Display a warning notice on APU FIRE handle and on MASTER SW (on panel 429VU) prohibiting their operation.
(e)Make certain that the following circuit breakers are open :

PANEL	SERVICE	IDENT.	LOCATION
131VU	FUEL/PUMP/SUPPLY	1QC	318/A53
131VU	FUEL/BLOW OFF/CTL	10QC	318/A51
131VU	FUEL/BLOW OFF/PUMP	11QC	318/A52
131VU	APU/START	50KA	317/B54
131VU	FIRE EXTING/SQUIB/A	1WF	317/B61
131VU	FIRE EXTING/SQUIB/B	2WF	318/A61
131VU	FUEL ISOL/VALVE/CTL	3WF	317/B62
131VU	FUEL LP/VALVE/CTL	4WF	318/A62
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63
131VU	FUEL LP/VALVE/SUPPLY	2QF	318/A63

(f)Position access platform.
(g)Open APU compartment access doors 313AL, 315AL and 316AR.
(h)Display a warning notice on FUEL VENT pushbutton switch located on APU compartment firewall prohibiting its operation.

(2)Procedure (Ref. Fig. 901)
(a)Remove nuts (3), washers (2) and bonding strip (5).
(b)Make certain that valve actuator is in closed position.
(c)Install valve actuator (4) and bonding strip (5) with washers (2) and nuts (3). Tighten nuts.
(d)Remove blanking cap and connect electrical connector 12QF (1) to valve

actuator receptacle.

(3)Test

(a)Close circuit breakers 1QC, 10QC, 11QC, 50KA, 3WF, 4WF, 1QF and 2QF.

(b)Operate APU FIRE handle and make certain that for the open and close positions, position indicated on valve actuator position indicator corresponds to actual position of actuator.

(c)Push APU FIRE handle (valve open).

(d)Install drain hose on adaptor (drain valve) of APU fuel feed system.

(e)Start up a left inner tank booster pump (Ref. 28-21-00, P. Block 1).

(f)Press FUEL VENT pushbutton switch located on APU compartment firewall. When air trapped in APU fuel feed system has been bled off and when fuel flows through drain hose, release FUEL VENT pushbutton switch.

(g)Remove drain hose and install cap on adapter.

(h)Shut down the left inner tank booster pump (Ref. 28-21-00, P. Block 1).

(i)Close circuit breakers 1WF and 2WF.

(4)Close-up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Remove warning notices.

(c)Close access doors 313AL, 315AL and 316AR.

(d)Remove access platform.

(e)On overhead panel, make certain APU FIRE handle is pushed. Lead seal handle.

(f)On APU section of panel 429VU, make certain MASTER SW is in OFF position.

(g)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

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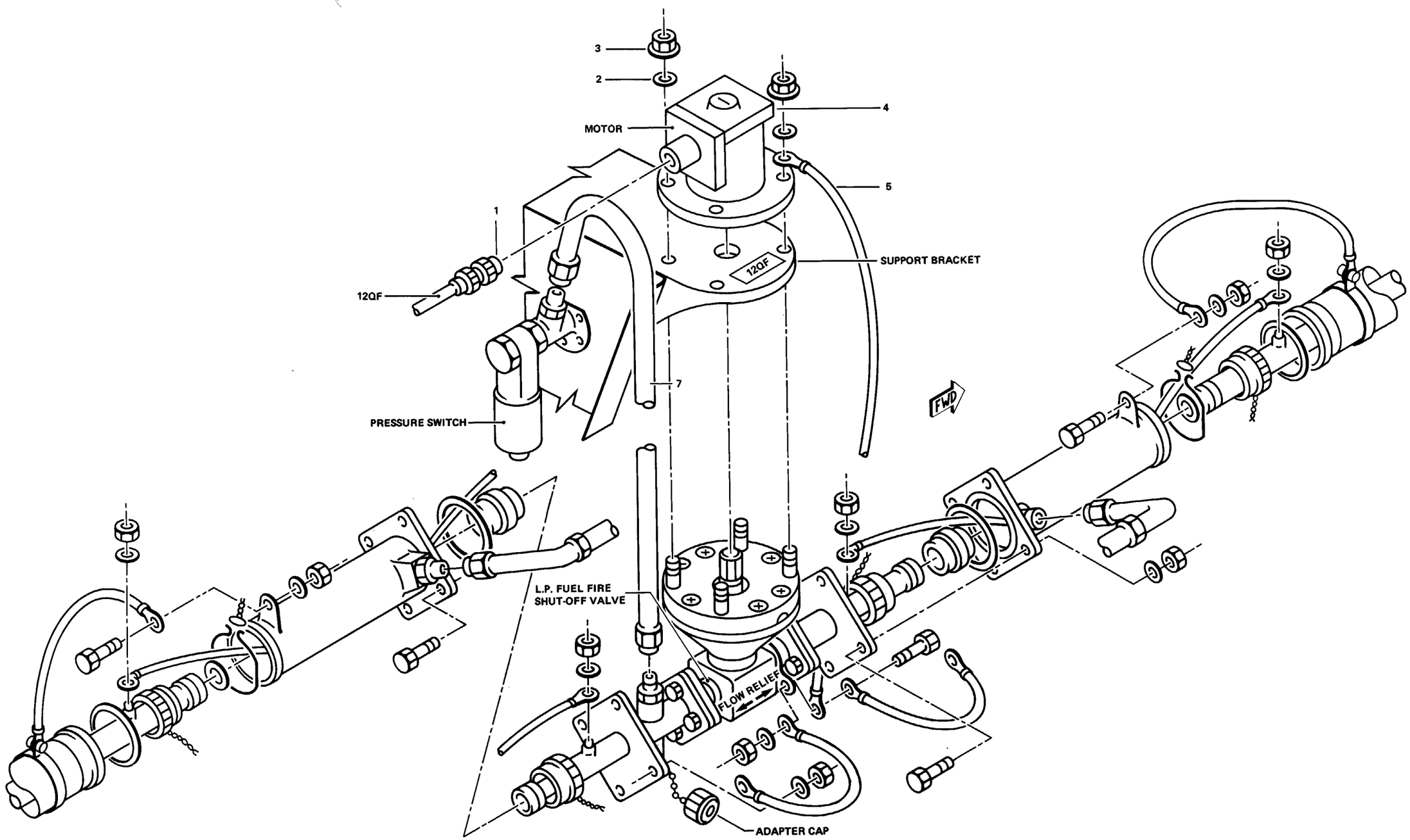

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Low Pressure Valve Actuator - Removal/Installation
Figure 901

R APU FUEL LOW PRESSURE SWITCH (2KE) - REMOVAL/INSTALLATION
R

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

CHECK THAT THE LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 2.50 m (8 ft. 4 in.)
B.	Containers
C.	Lint-Free Cloth
D. Material No. 04-012	Common Greases (Ref. 20-31-00)
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 28-21-00, P. Block 501	Fuel Pump System
- 32-12-11, P. Block 301	Main Gear Main Door - (Ground Door(s) Opening)

2. Procedure

A. Job Set-Up
(1)Position access platform at zone 313.
(2)Open access doors 315AL, 316AR and 313AL.
(3)In flight compartment, on APU section of panel 429VU
(a)Make certain that MASTER SW is in OFF position.
(b)Make certain that FUEL PUMP pushbutton switch is pressed (in).
(4)Display a warning notice on APU section of panel 429VU prohibiting APU pump operation.
(5)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	317/B54
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63
131VU	FUEL/BLOW OFF/CTL	10QC	318/A52

(6)Place a container under APU fuel low pressure switch 2KE.

B. Removal
(Ref. Fig. 401)
(1)Disconnect electrical connector (5) from pressure switch.
(2)Cut and remove lockwire and remove threaded plug (3).
NOTE : Sealing valve closes automatically as threaded plug (3) is removed.
(3)Remove pressure switch (4) and the two O-rings (1) and (2).
(4)Cap sealing valve.

C. Preparation of Replacement Component
(1)Depreserve replacement component.
(2)Clean and inspect pressure switch (4) interface and/or adjacent area.

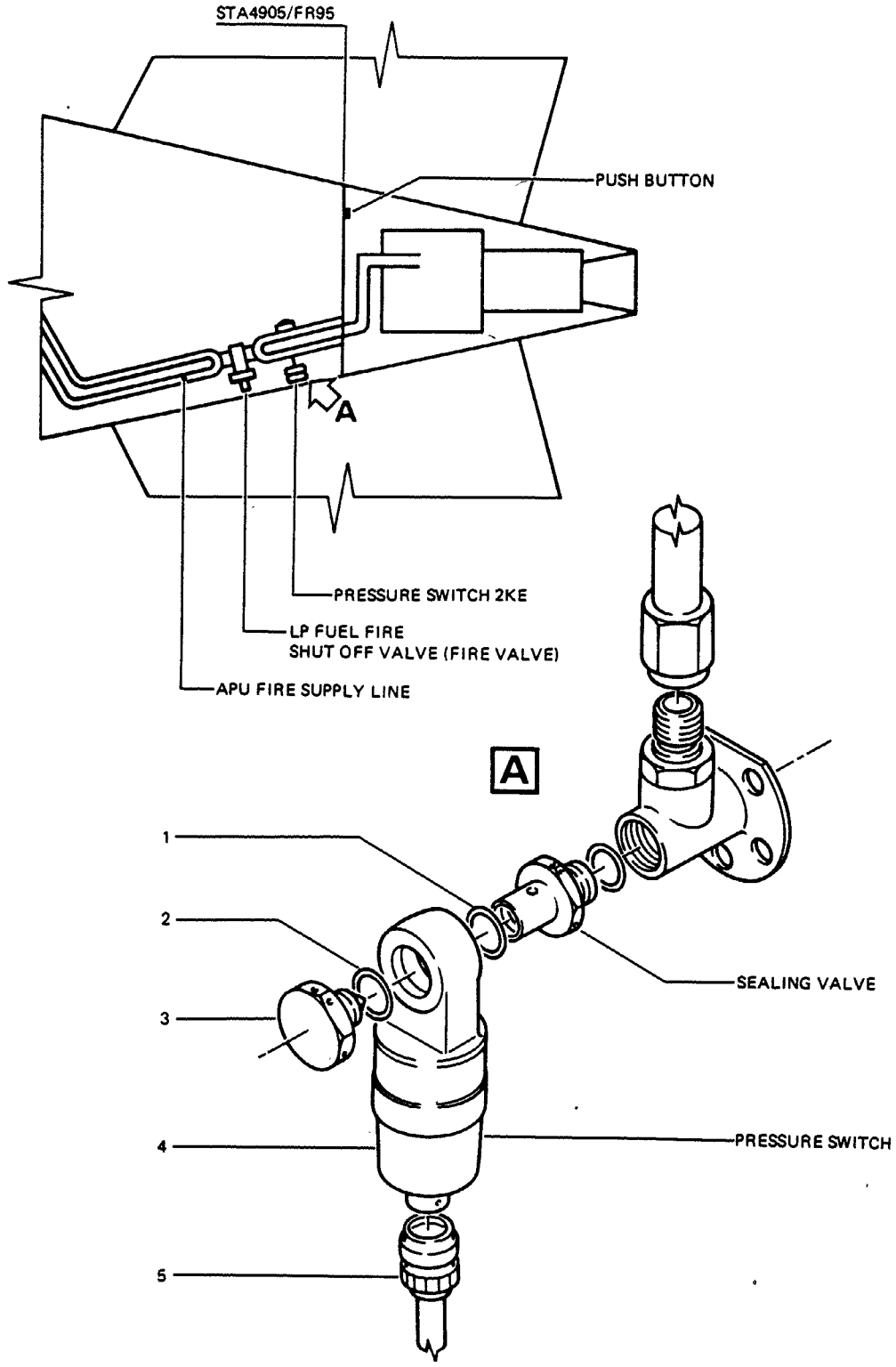
D. Installation
(1)Remove blanking plug/cap from sealing valve.
(2)Smear new O-rings (1) and (2) with fuel or Material No.04-012.
(3)Install O-ring (1) on sealing valve and install pressure switch, making certain that O-ring is correctly positioned.
(4)Install O-ring (2) in groove provided on pressure switch.
(5)Install threaded plug (3) on pressure switch, tighten and wirelock.
(6)Connect electrical connector (5) to pressure switch.

E. Test
(1)Make certain that no other maintenance procedures are being carried out on the fuel system.
(2)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301). Make certain that electronics racks ventilation is correct.
(3)Open left main gear door (Ref. 32-12-11, P. Block 301).
(4)Remove safety clips and tags and close the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	317/B54
131VU	APU/FUEL ISOL/VALVE/SUPPLY	1QF	317/B63
131VU	FUEL/BLOW OFF/CTL	10QC	318/A52

(5)On overhead panel make certain that APU FIRE handle is pushed in.
(6)On APU section of panel 429VU, select APU system to following configuration :
(a)MASTER SW in ON position
(b)FUEL PUMP pushbutton switch pressed (in) (OVRD legend off).
(7)On mechanical center pedestal 9VU, make certain that ENG1 HP fuel shutoff valve control lever is in OFF position.
(8)Start up a left inner tank pump (Ref. 28-21-00, P. Block 501). With fuel feed system pressurized, aurally check that APU fuel pump is no longer operating (in zone 147).
(9)Check APU fuel low pressure switch 2KE.
(10)Shut down left inner tank pump (Ref. 28-21-00, P. Block 501).
(11)On APU section of panel 429VU, place MASTER SW in OFF position.

F. Close-Up



APU Fuel Low Pressure Switch
Figure 401

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL, 316AR and 313AL.
(3)Remove access platform.
(4)Close left main landing gear door (Ref. 32-12-11, P. Block 301).
(5)Remove warning notices.
(6)On APU section of panel 429VU, make certain that MASTER SW is in OFF position.
(7)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(8)Remove all ground handling and maintenance equipment, standard and special tools, together with ground power and replenishing equipment, all access equipment and miscellaneous items.

APU FUEL LOW PRESSURE SWITCH 2KE - INSPECTION/CHECK

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

BEFORE PRESSURIZING FUEL SYSTEMS, MAKE CERTAIN THAT FUEL SYSTEM UNDER MAINTENANCE HAS BEEN ISOLATED.

BEFORE UNDERTAKING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM, MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE AND IN PROXIMITY TO THE WORK AREA.

1. Reason for the Job

A. To check for correct condition and operation of pressure switch 2KE.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 4.84m (15ft. 10 in.)
Referenced Procedures - 49-34-11, P. Block 401	APU Fuel Low Pressure Switch

3. Procedure

A. Job Set-Up
(1)Position access platform at zone 313.
(2)Remove pressure switch 2KE (Ref. 49-34-11, P. Block 401).

B. Check
(1)Check for correct condition of paint and anti-corrosion coating.
(2)Visually check fuel delivery port.
(3)Visually check vent port in casing.
(4)Visually check electrical connector. If necessary, check continuity and insulation of electrical circuit.

C. Close-Up
(1)Install pressure switch 2KE (Ref. 49-34-11, P. Block 401)
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Remove all ground handling and maintenance equipment, standard and special tools, together with ground power equipment, all access equipment and miscellaneous items.

IGNITION AND STARTING - DESCRIPTION AND OPERATION

1. General

A. The APU ignition and starting system is designed to rotate and to accelerate the APU rotors and to provide ignition of the fuel/air mixture in the combustion chamber. Main components of the system are the starter motor, ignition unit, and igniter plug.
Electrical power for starting is provided by the aircraft batteries, a ground power connection or by power from the main engine generators.
The APU ignition and starting system is automatically controlled by the Electronic Control Box (ECB) (59KD).

2. Component Location

R **ON A/C 001-100,

(Ref. Fig. 001)

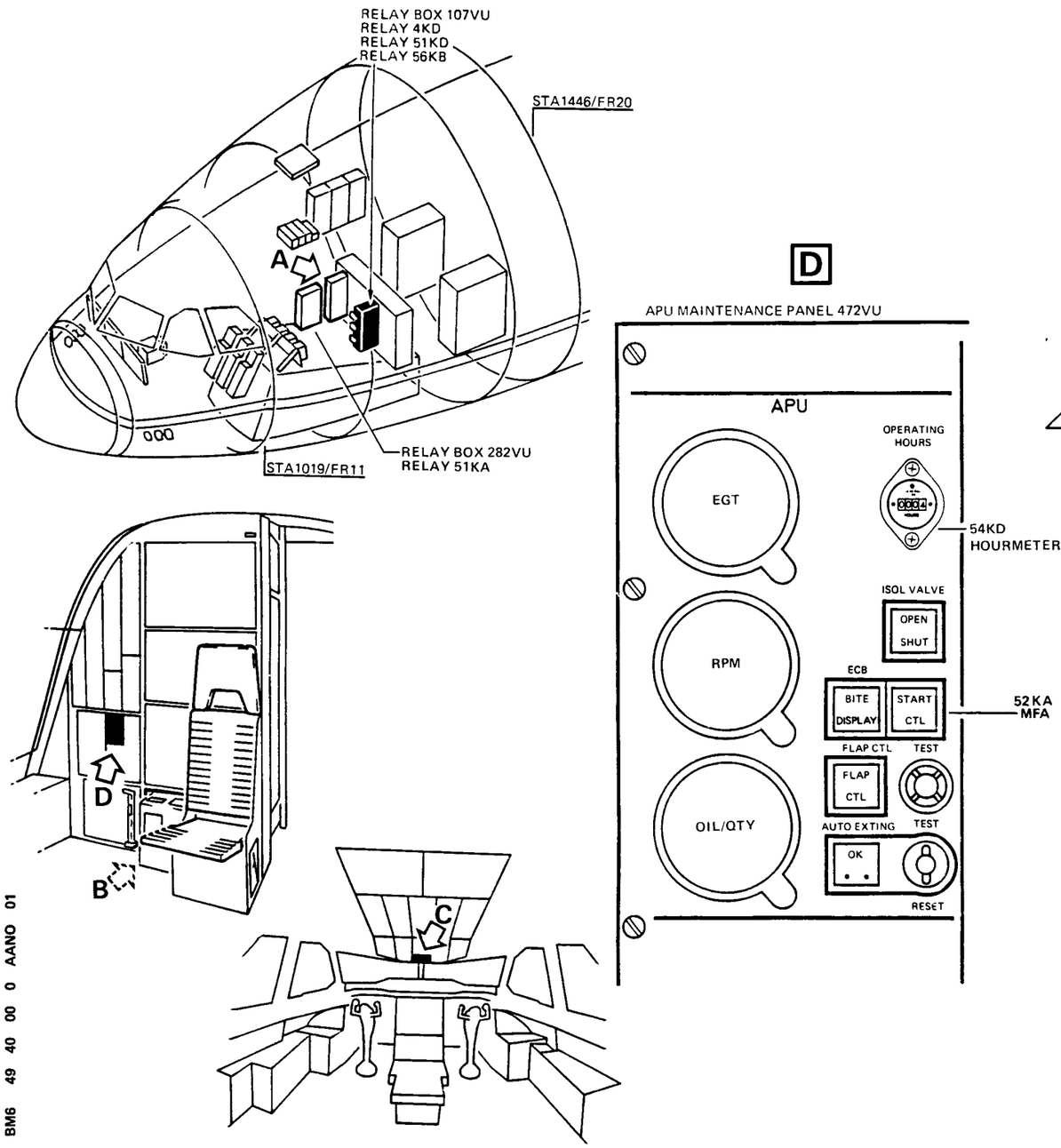
R **ON A/C 101-200,

(Ref. Fig. 002)

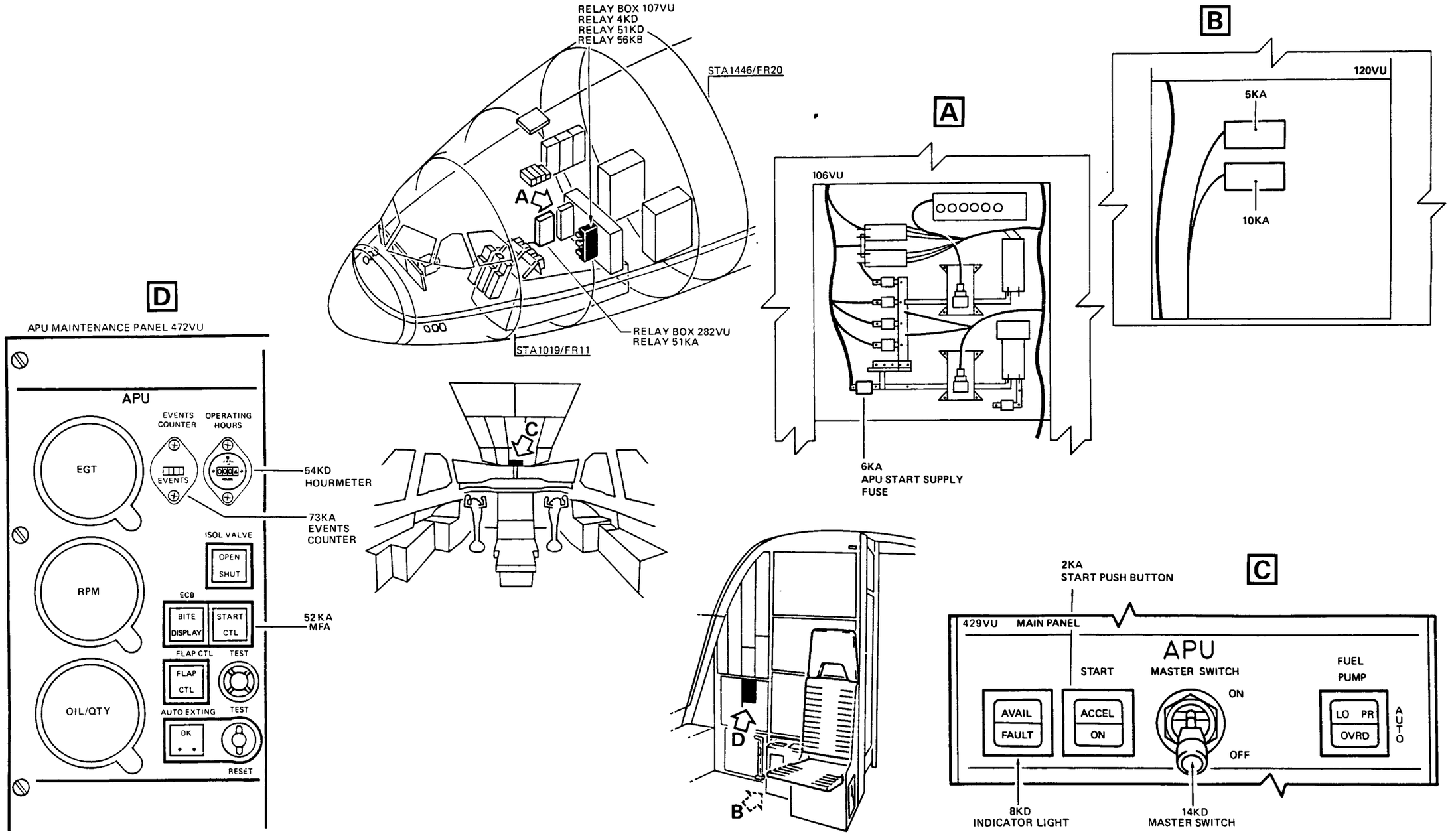
R **ON A/C ALL

(Ref. Fig. 003)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	UNIT-IGNITION		316	315AL 316AR	49-41-11
	PLUG-IGNITER		316	315AL 316AR	49-42-12
	ELECTRICAL LEAD-IGNITER PLUG		316	315AR 316AR	49-42-11
	SPRAG CLUTCH-STARTER		315	315AL 316AR	49-42-14
2KA	P/BSW-START	429VU	212		
5KA	CONTACTOR-START	120VU	212		
6KA	FUSE-APU START SUPPLY	106VU	122	132AZ	
8KA	MOTOR-STARTER		315	315AL 316AR	49-42-13
10KA	CONTACTOR-BACKUP START	120VU	212		
51KA	RELAY-60% SPEED	282VU	122		
52KA	MFA-START, CTL	472VU	212		
8KD	INDICATOR-AVAIL/FAULT	429VU	212		
14KD	SWITCH-MASTER	429VU	212		
59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11

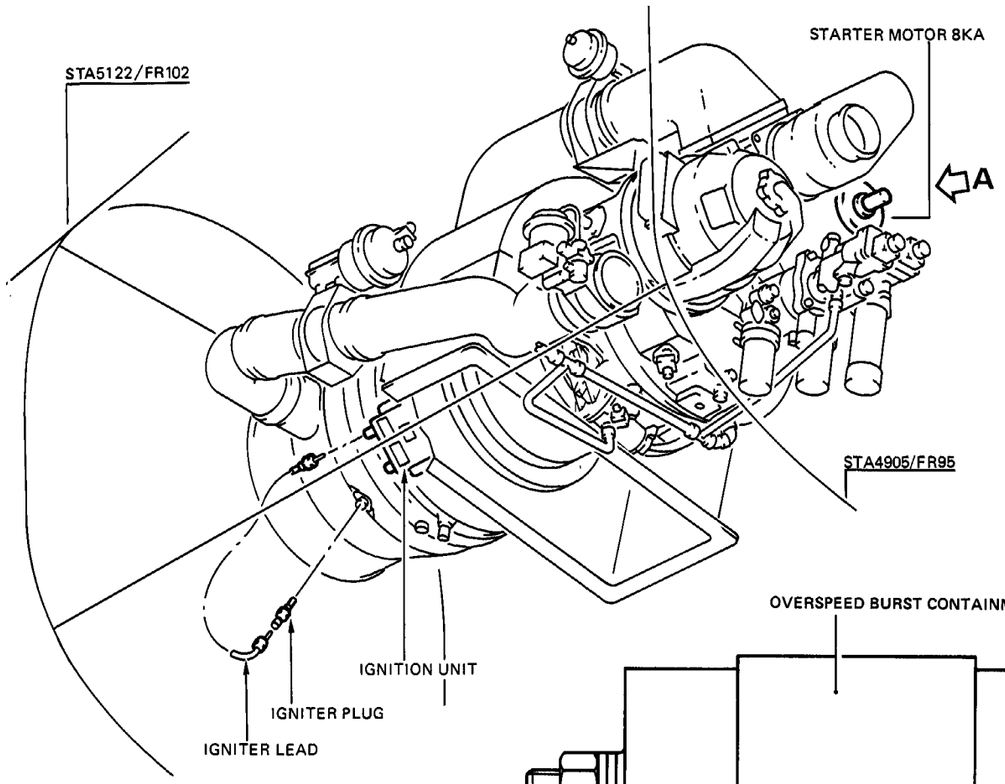


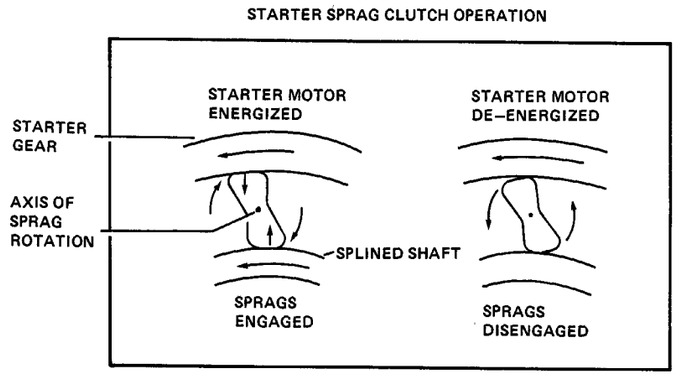
Ignition and Starting - Component Location
Figure 001

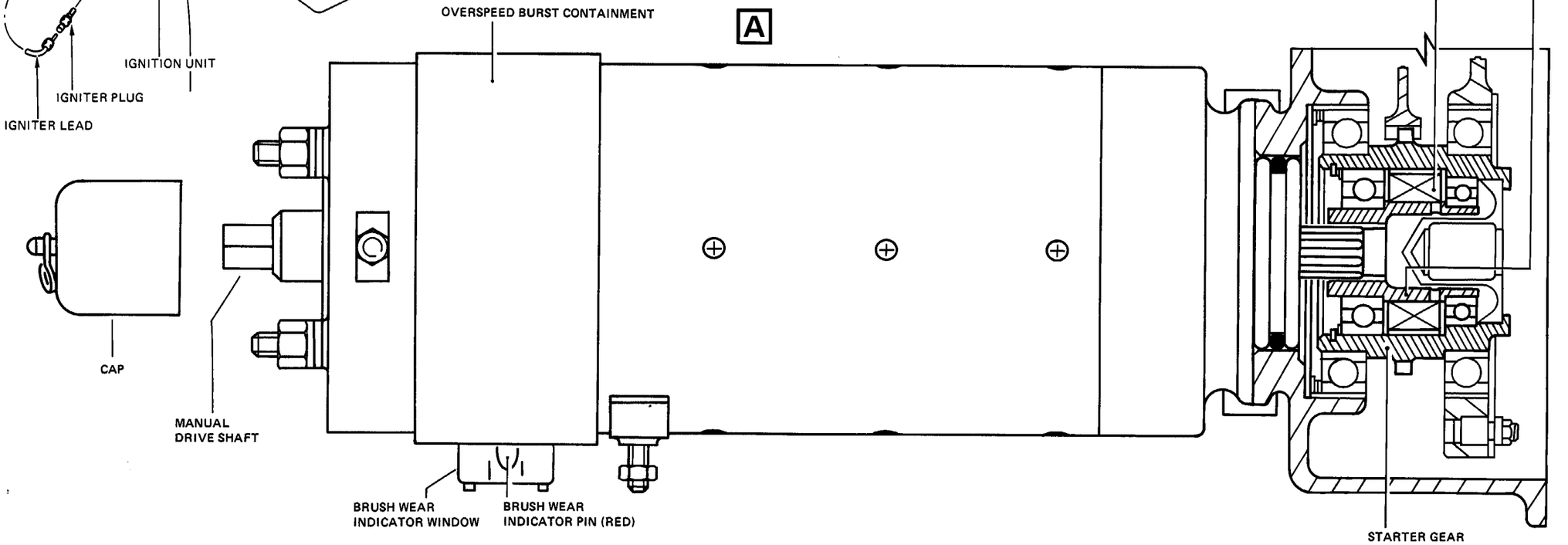


Ignition and Starting - Component Location
Figure 002

R







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APU - Component Location
Figure 003

3. Description
(Ref. Fig. 003)

A. The APU ignition system consists of an ignition unit, igniter plug and igniter plug electrical lead. They are mounted on the right side of the APU. The ignition unit is a high energy unit that converts 28 V DC into a high voltage of approx. 18000 V which is conducted to the ignition plug by the ignition lead.

B. The APU start system consists of a starter motor and a starter sprag clutch.
(1) The starter motor 8KA is a direct current, high speed electrical motor, mounted to the left side of the gear box. The motor is powered by 28 V DC from the ground power unit, engine generators or from the A/C batteries.
A brush wear indicator is installed at the overspeed burst containment.
For manual rotation of the engine, a drive shaft is located on the front of the starter motor.
(2) The starter sprag clutch is the device that provides the mechanical connection between the starter motor and the APU gearbox.
During start, the sprags engage between the splined shaft and the starter gear.
At 42% to 50% speed,(dependant on acceleration rate) a signal from the ECB de-energizes the starter motor. As the starter motor speed decreases the sprags disengage.

4. Operation
(Ref. Fig. 004)
(Ref. Fig. 005)
(Ref. Fig. 006)
(Ref. Fig. 007)

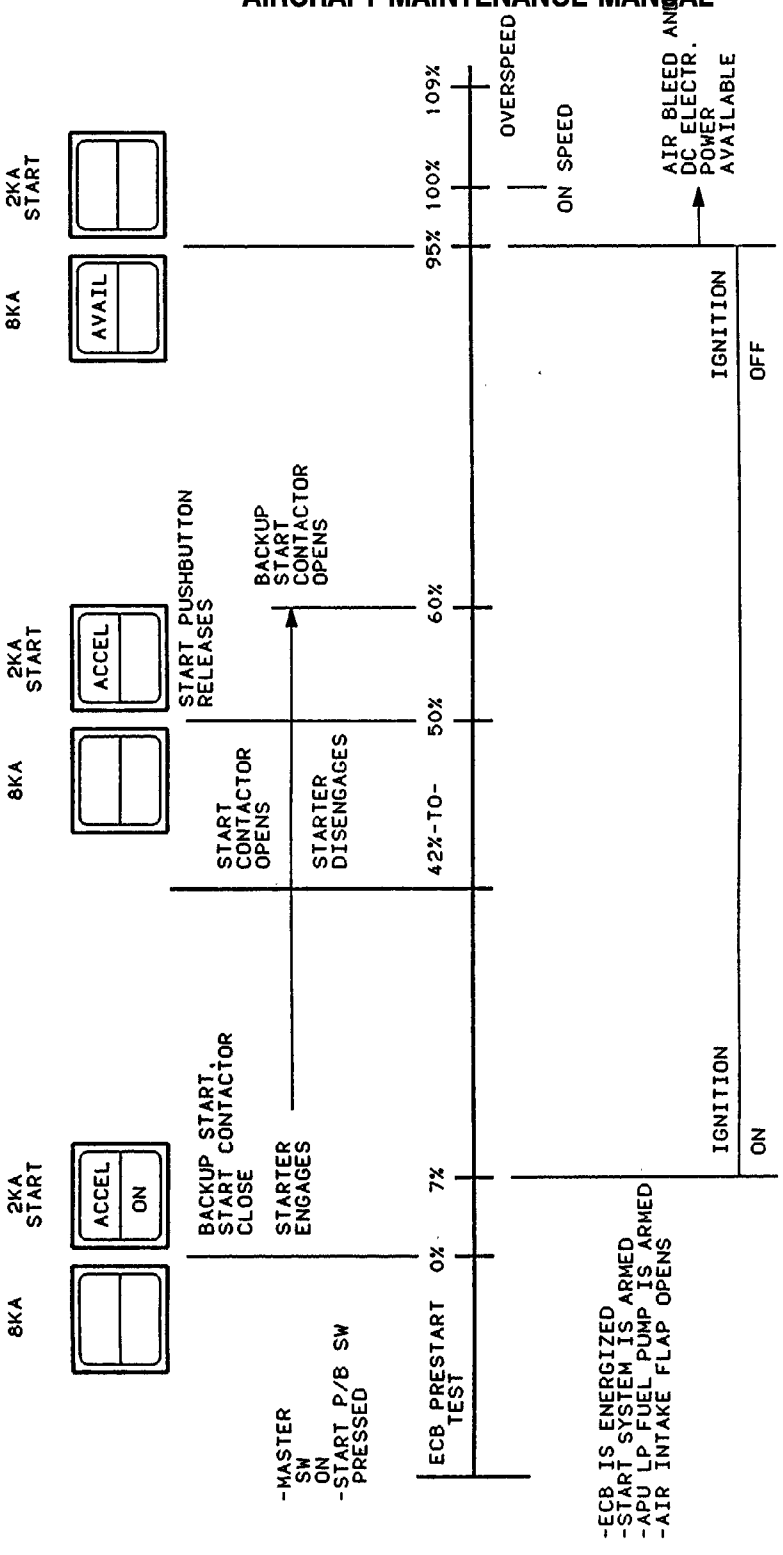
A. Starting
(1)Normal Condition
(a)APU MASTER SW 14KD is placed to the ON position:
- ECB is energized
- Start system is armed
- APU LP fuel pump is armed
- Fuel isolation valve 11QF opens
- ISOL VALVE position indicator 7QF, OPEN comes on
- Air intake flap opens (Ref. 49-16-00)
- EGT/RPM indication is armed
- On R ECAM display unit, the APU system page appears

(b)START pushbutton switch 2KA is pressed (ON legend comes on):
- De-oil solenoid energizes (dependent on temperature).
- Backup start contactor 10KA closed
- APU start is initated
- ECB prestart test is initiated
- After approx 2 sec. and air intake flap is in open position the start contactor 5KA closed
- On START pushbutton switch, the blue ACCEL light comes on
- Starter motor 8KA engages

(c)At 7% RPM
- 7% relay energizes
- ECB energizes the ignition system
- Fuel solenoid valve opens

(d)At 42%to50% RPM (dependant on acceleration rate)
- Start contactor 5KA opens
- Starter motor 8KA disengages
- START pushbutton switch 2KA releases and white ON legend goes off

(e)At 60% RPM
- Backup start contactor 10KA opens
- OIL QTY indication switches to dynamic
- De-oil solenoid de-energizes



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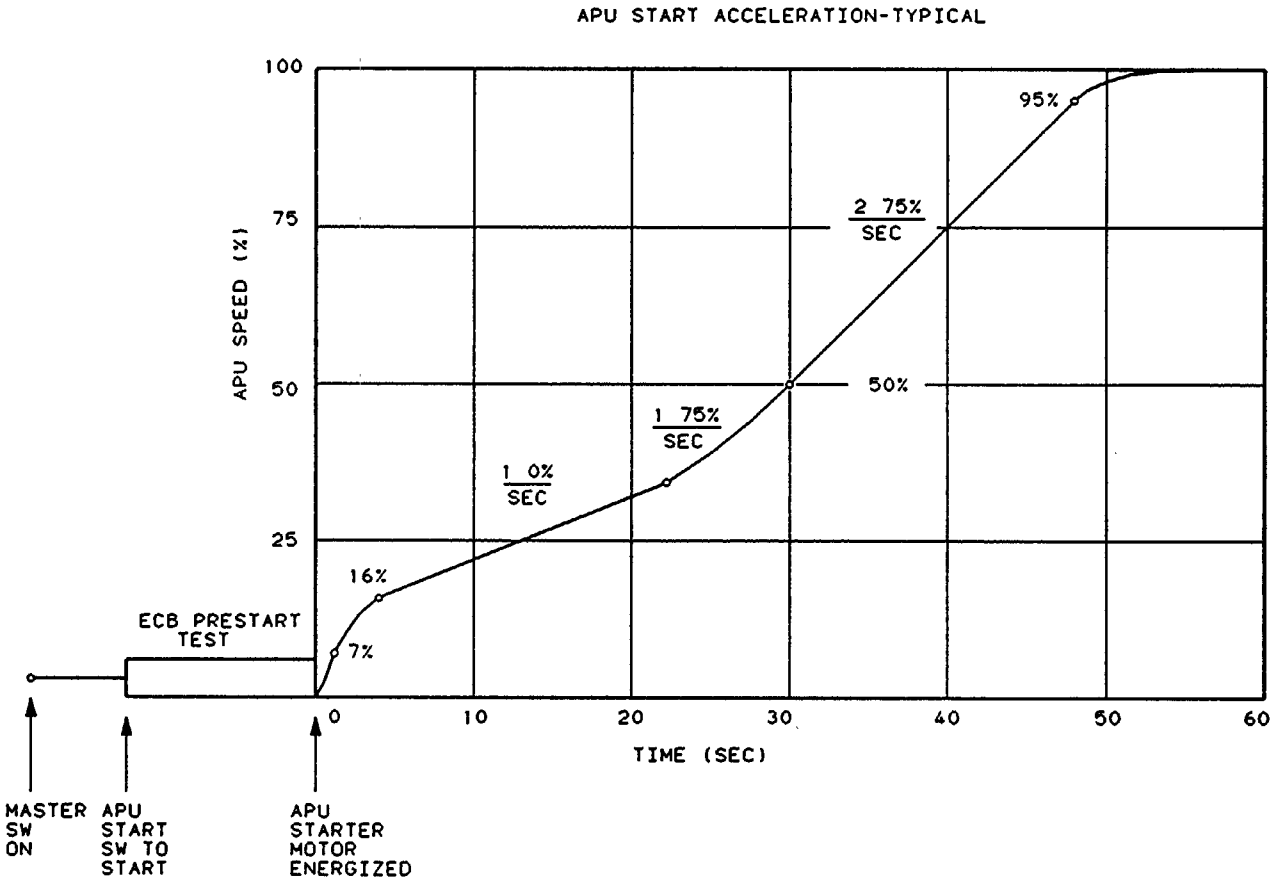
APU Start Sequence
Figure 004



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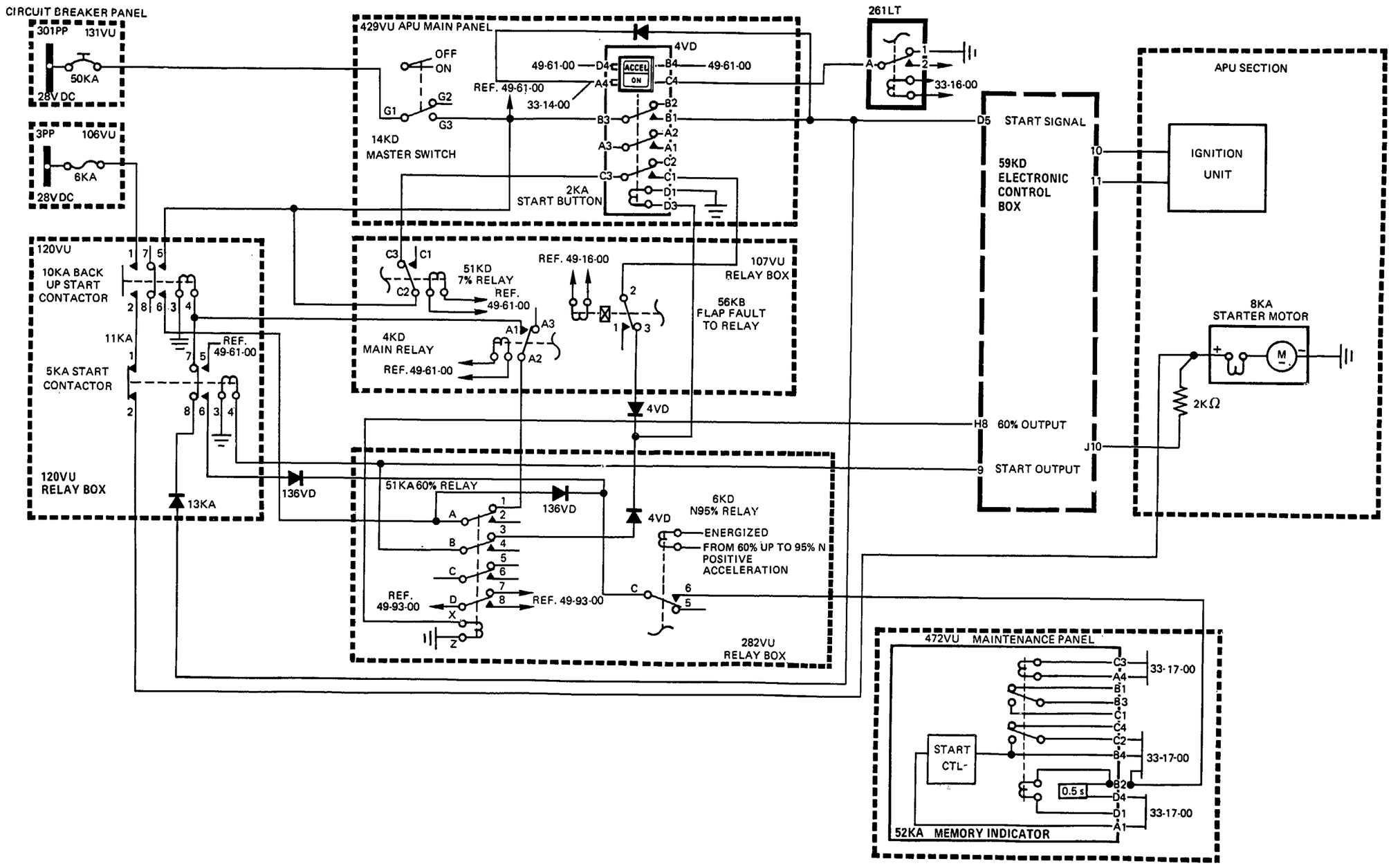
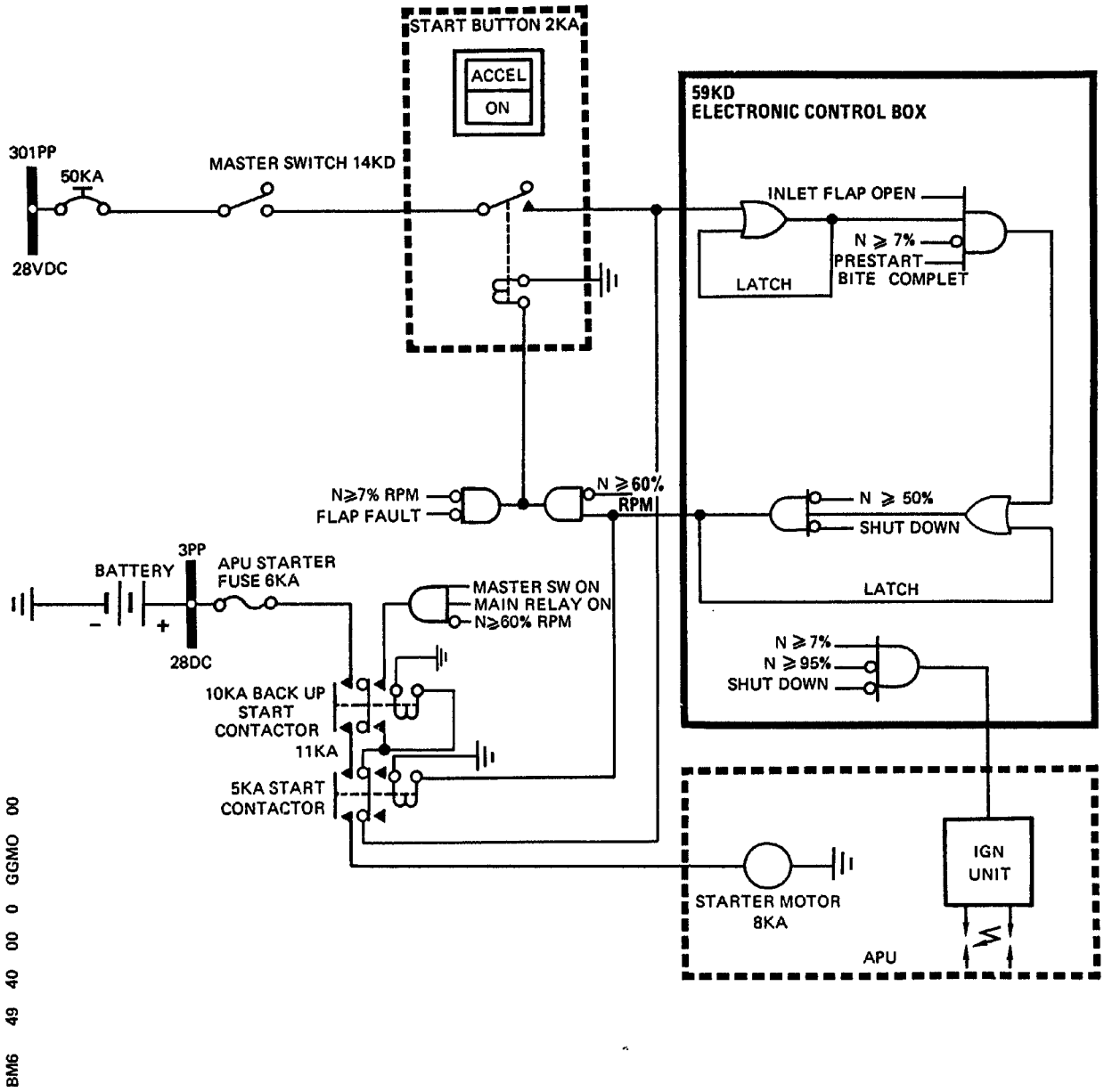
APU Start Acceleration
Figure 005



Starting - System Schematic
Figure 006

BM6 49 40 00 0 AENO 01



Starting - Block Schematic
Figure 007

(f)At 95% RPM
- Ignition system is deenergized
- On the START pushbutton switch, the ACCEL light goes off
- AVAIL indicator light 8KD comes on
- Fuel flow divider N/C solenoid valve opens
- Air bleed and DC electrical power available
- Hour meter on
- After 30 sec., the ECAM APU system page disappears

R **ON A/C 101-200,

- EVENTS COUNTER 73KA counts

R **ON A/C ALL

(Ref. Fig. 008)

(2)Abnormal Condition

(a)If the start contactor 5KA does not de-energize at 50% rpm:
- At 60% RPM
  . Backup start contactor 10KA opens
  . Starter motor disengages
  . START pushbutton switch 2KA drops out and white ON legend goes off
  . FAULT indicator light 8KD comes on
- AT 95% RPM
  . START CTL MFA comes on (Ref. 33-17-00).

(b)If the backup start contactor 10KA does not de-energize at 60% RPM
- At 95% RPM

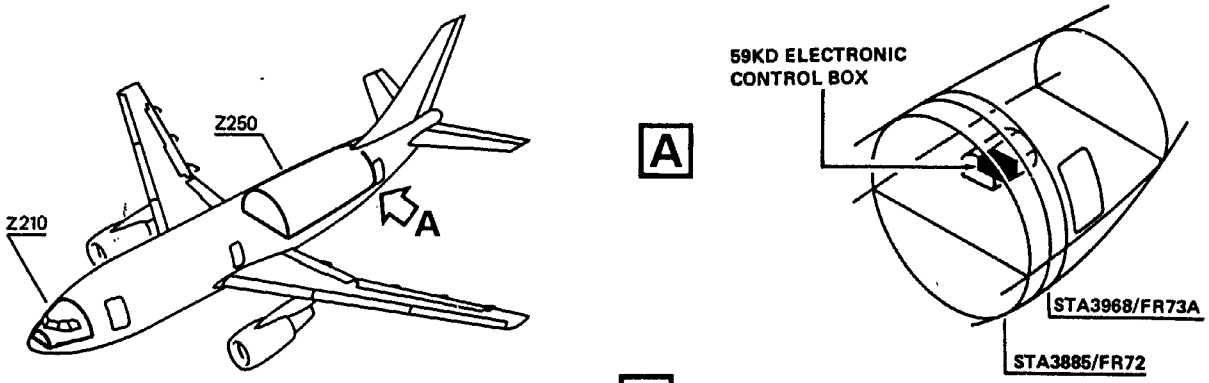
R **ON A/C 101-200,

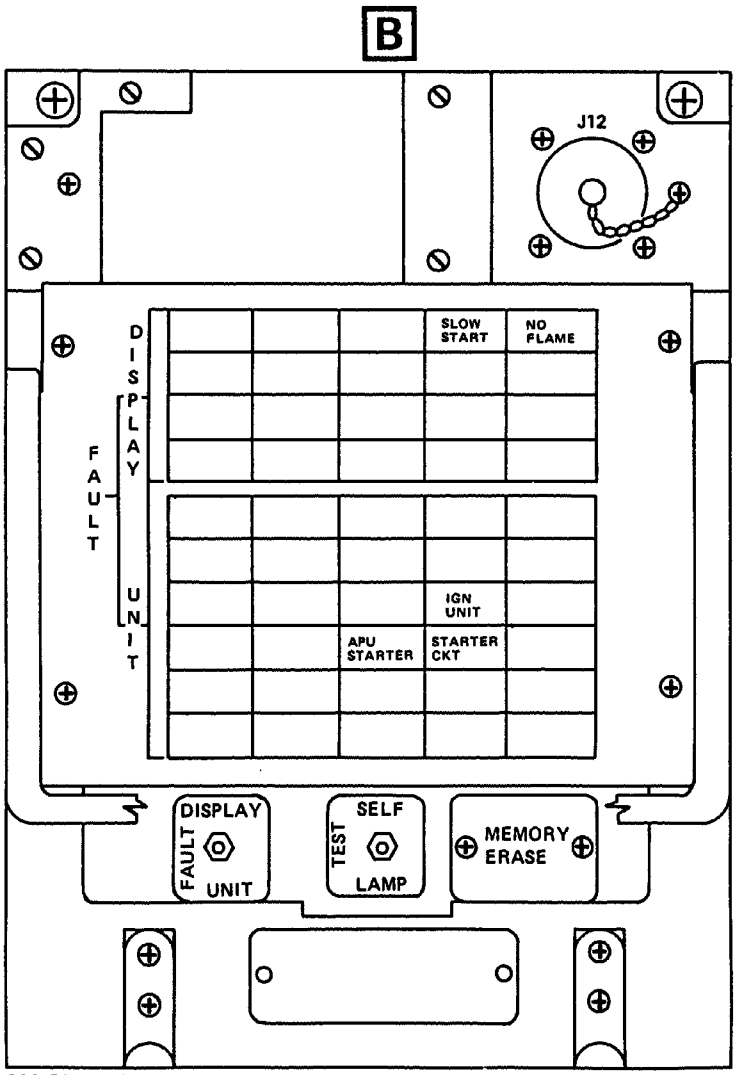
. EVENTS COUNTER counts

R **ON A/C ALL

. START CTL MFA comes on (Ref. 33-17-00).

(c)If acceleration does not reach 7% within 30 seconds, 20% in 50 seconds or 50% in 70 seconds:
- Protective shutdown is initiated (Ref. 49-61-00)
- Fault display/unit is stored in the ECB
- FAULT indicator light 8KD comes on
- ECB BITE DISPLAY MFA comes on (Ref. 33-17-00).





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ECB FRONT PANEL
POSSIBLE FAULT ILLUMINATION
FOR START SYSTEM

ECB - Fault Ilumination
Figure 008

IGNITION UNIT - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

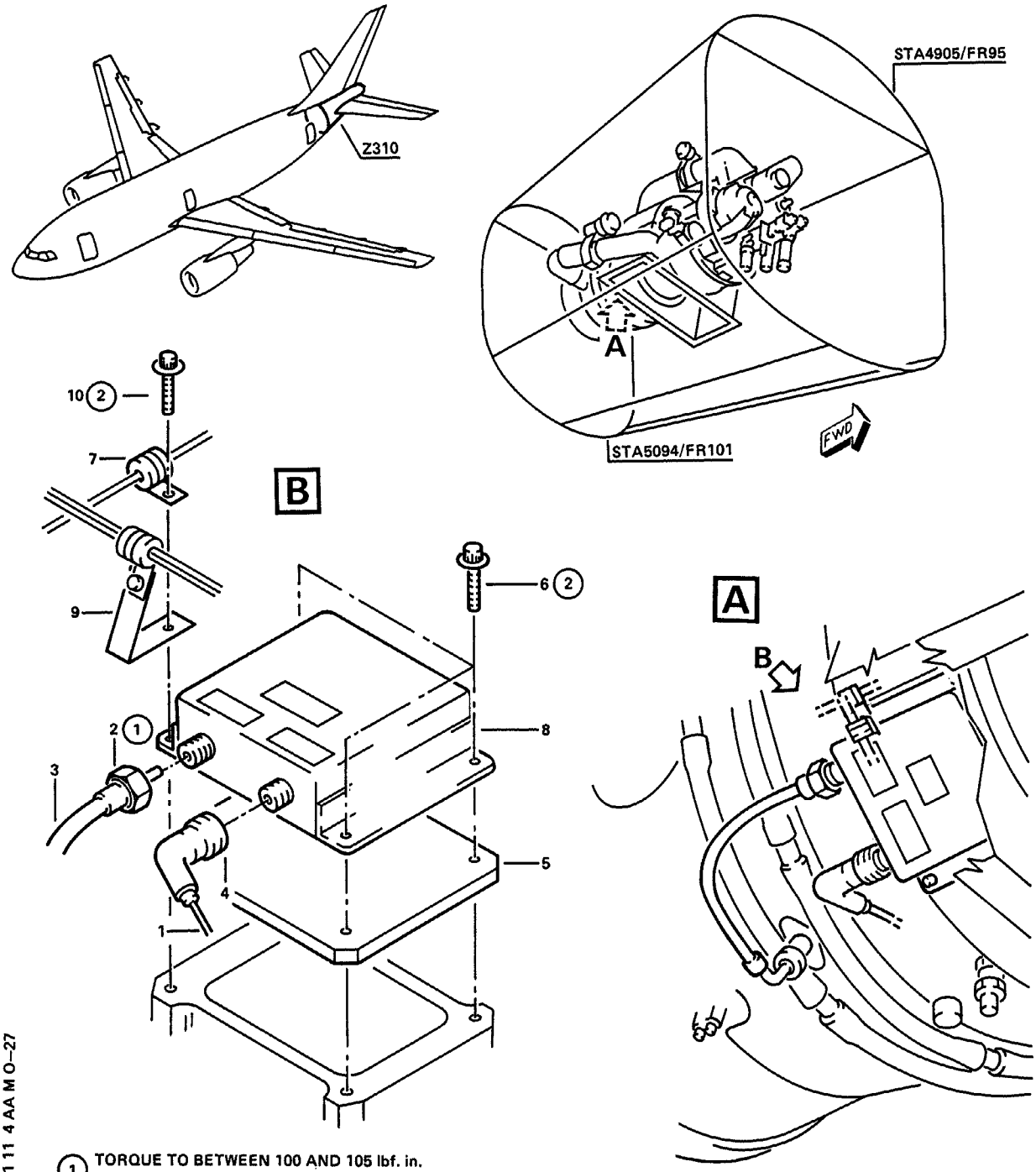
1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 0.032 in. (0.8 mm) dia.
D.	Torque Wrench, 0-180 lbf.in. (0-2.00 m.daN)

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-42-11, P. Block 401	Igniter Plug Electrical Lead

2. Procedure
(Ref. Fig. 401)



BM6 49 41 11 4 AA M O–27

(1) TORQUE TO BETWEEN 100 AND 105 lbf. in. (1.13 AND 1.19 m.da N)

(2) TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.57 AND 0.60 m.da N)

Ignition Unit
Figure 401

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB SUPPLY/BACK UP	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53

(2)Position access platform.

(3)Open access door 316AR.

B. Removal

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(1)Cut and remove lockwire.
(2)Disconnect electrical connector P4 (4) and electrical lead connector (2) from ignition unit (8).
(3)Remove bolt (10) disconnect clamp (7) and bracket (9).
(4)Remove bolts (6), insulator (5) and ignition unit (8).

C. Preparation for Installation

(1)Check insulator (5) for damage. Replace if necessary.
(2)Check clamp (7) and bracket (9) for damage. Replace if necessary.
(3)Check electrical lead (3) for damage. Replace if necessary (Ref. 49-42-11, P. Block 401).

D. Installation

(1)Position ignition unit (8) and insulator (5) onto APU housing and install bolts (6).
  (a)TORQUE bolts (6) to between 50 and 53 lbf.in. (0.57 and 0.60 m.daN).
(2)Position bracket (9), clamp (7) and install bolt (10).
  (a)TORQUE bolts (10) to between 50 and 53 lbf.in. (0.57 and 0.60 m.daN).
(3)Connect electrical connector P4 (4) to ignition unit (8).
(4)Connect electrical lead connector (2) to ignition unit (8).
  (a)TORQUE connector (2) to between 100 and 105 lbf.in. (1.13 and 1.19 m.daN).
(5)Safety connectors (2, 4) with lockwire.
(6)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.

E. Test

(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(2)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 316AR.
(3)Remove access platform.

IGNITER PLUG ELECTRICAL LEAD - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY AND FIRE HAZARD. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety clips and tags
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Torque Wrench, up to 1.5 m.daN (132.8 lbf.in.)
E.	Spring Balance, up to 45N (10 lbf.)

Referenced Procedure

- 49-10-00, P. Block 501	Power Plant

2. Procedure

(Ref. Fig. 401)

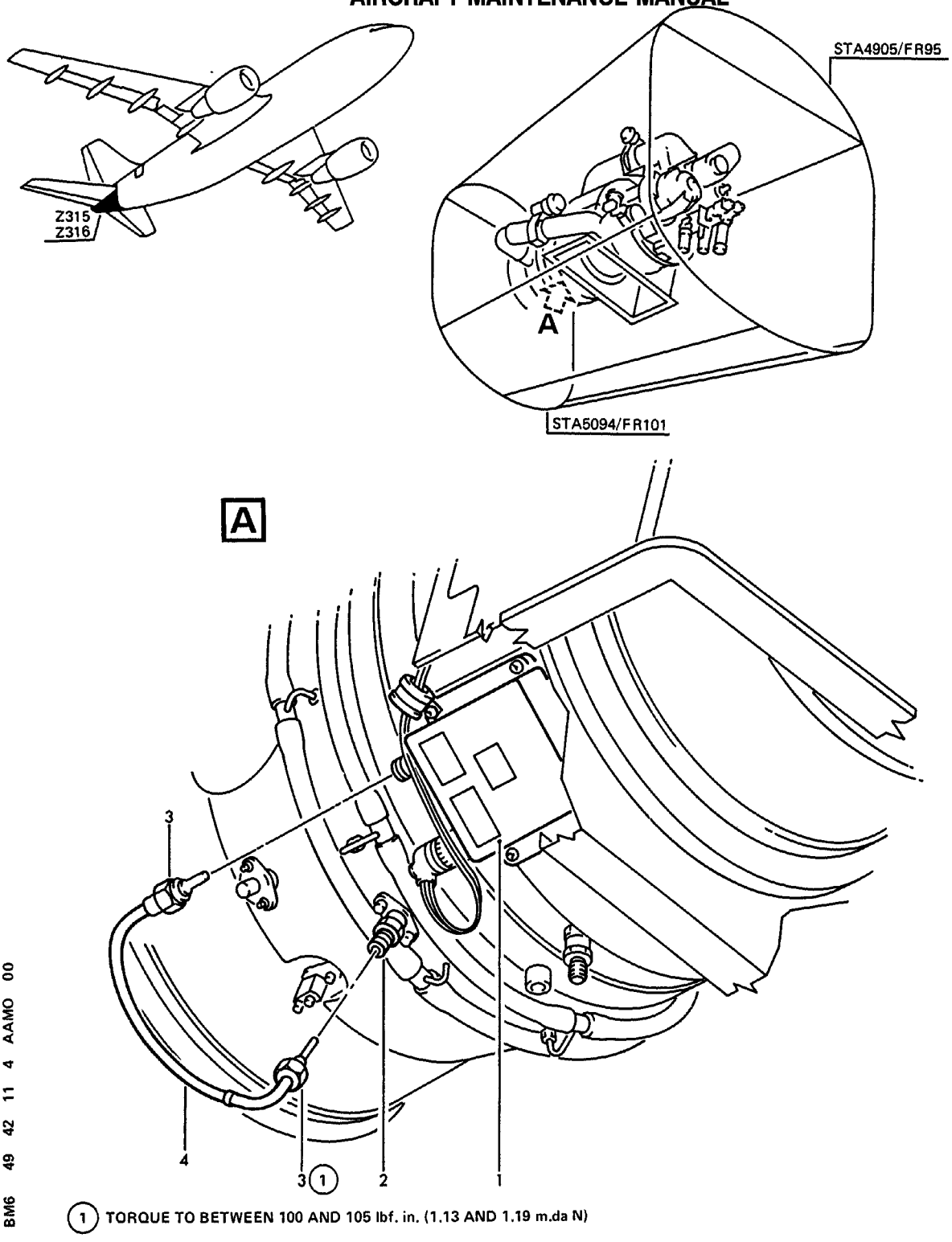
A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB/BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB/BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB/SUPPLY/MAIN	1KD	B57

(2)Position access platform.

(3)Open access door 316AR.



(1) TORQUE TO BETWEEN 100 AND 105 lbf. in. (1.13 AND 1.19 m.da N)

Igniter Plug Electrical Lead
Figure 401

B. Removal

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(1)Cut and remove lockwire at each end of electrical lead (4).
(2)Disconnect electrical lead (4) from ignition unit (1).
(3)Loosen and completely disengage coupling nut (3) from igniter plug (2).
NOTE : Make certain, that igniter plug (2) is not loosened.
(4)Connect spring balance to elbow of electrical lead (4) at igniter plug.
(5)Check that force required to remove electrical lead (4) from igniter plug (2) is min. 1 lbf. (4.5 N). If the pulling force is less than 1 lbf. (4.5 N), replace igniter plug electrical lead (4).
(6)Disconnect spring balance.

C. Preparation for Installation

(1)Check insulation of igniter plug electrical lead (4) for damage. No damage is permitted.
(2)Check terminals of electrical lead (4) for damage. No damage is permitted.
(3)Check threads and outer surfaces of coupling nuts (3) for damage. No damage is permitted.

D. Installation

(1)Fit electrical lead (4) to igniter plug (2) and ignition unit (1).
(2)Secure lead with coupling nuts (3).
(3)TORQUE coupling nuts (3) to between 100 and 105 lbf. in. (1.13 m.daN and 1.19 m.daN).
(4)Safety coupling nuts (3) with lockwire.
(5)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.

E. Test

(1)Start APU (Ref. 49-10-00, P. Block 501).
(2)Check correct ignition operation.
(3)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 316AR.
(3)Remove access platform.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL A WITH AN INSULATED HANDLE.

WARNING: USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT (Mat. No. 11.002) SOLEVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

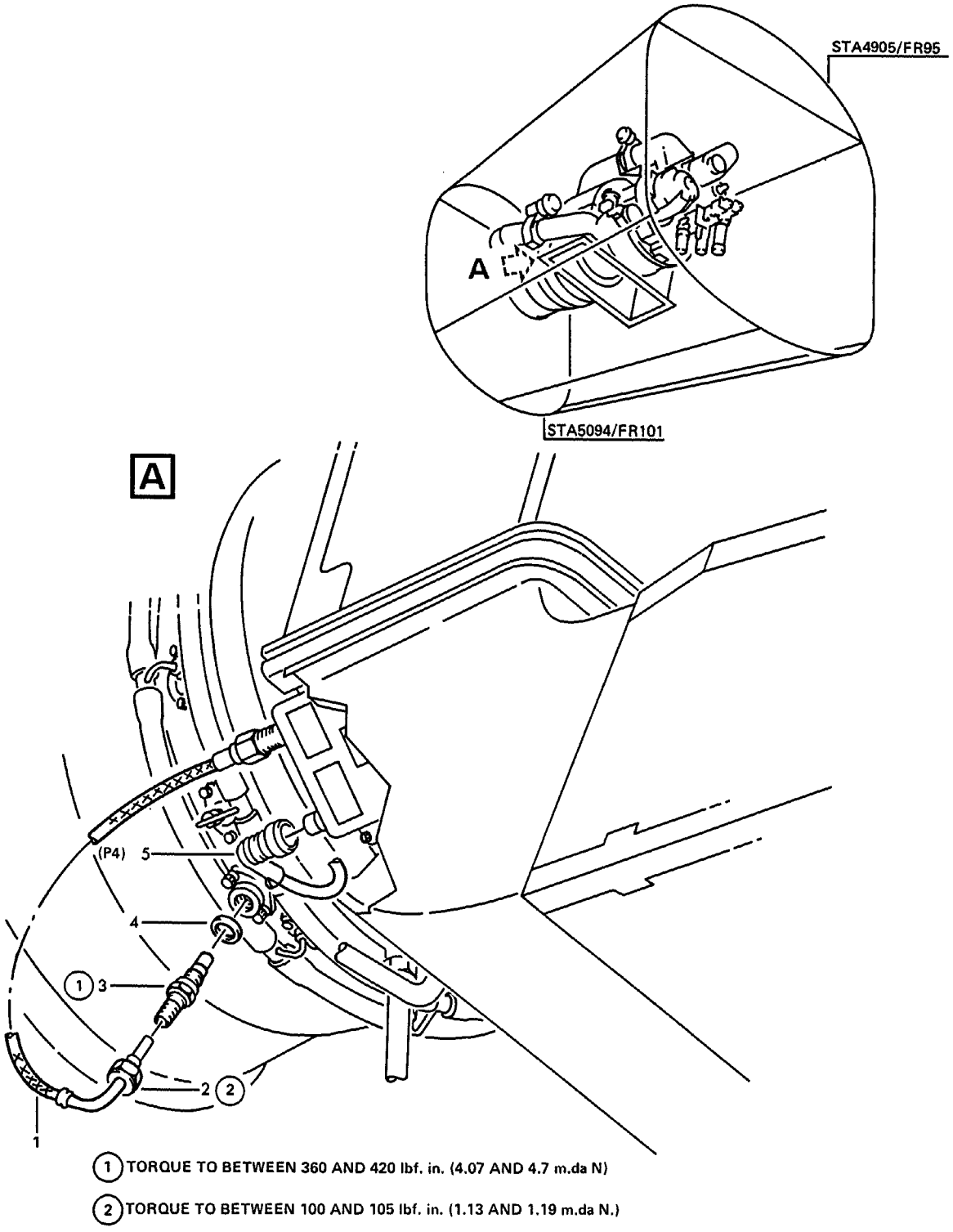
1. Removal/Installation

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)Material No. 04-014	Common Greases (Ref. 20-31-00)
(4)	Gasket
(5)	Torque Wrench, 170-550 lbf.in. (1.9-6.2 m.daN)
(6)	Torque Wrench, 45-140 lbf.in. (0.5-1.6 m.daN)
(7)	Blanking Cap and Plugs
(8)	Corrosion - Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(9)	Spring Balance up to 45N (10 lbf.)
Referenced Procedure - 49-42-11, P. Block 401	Igniter Plug Electrical Lead

B. Procedure
(Ref. Fig. 201)
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB/BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB/BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB/SUPPLY/MAIN	1KD	B57



(1) TORQUE TO BETWEEN 360 AND 420 lbf. in. (4.07 AND 4.7 m.da N)

(2) TORQUE TO BETWEEN 100 AND 105 lbf. in. (1.13 AND 1.19 m.da N.)

Igniter Plug
Figure 201

(b)Position access platform and open access doors 315AL and 316AR.

(2)Removal

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL A WITH AN INSULATED HANDLE.

(a)Disconnect electrical connector P4 (5) from ignition unit and fit blanking cap and plug.

(b)Cut and remove lockwire from electrical lead (1) at igniter plug (3).

(c)Loosen and completely disengage coupling nut (2) from igniter plug (3).

(d)Connect spring balance to elbow of electrical lead (1) at igniter plug.

(e)Check that force required to remove electrical lead (1) from igniter plug (3) is min. 1 lbf. (4.5 N).

(f)If the pulling force is less than 1 lbf. (4.5 N), replace igniter plug electrical lead (1) Ref. 49-42-11, P. Block 401.

(g)Disconnect spring balance.

(h)Remove igniter plug (3) and gasket (4). Discard gasket. Fit blanking plug to orifice in turbine shroud.

(3)Installation

(a)Coat threads of igniter plug (3) using common grease (Mat. No. 04-014).

(b)Remove blanking plug, position new gasket (4) and install igniter plug (3). TORQUE igniter plug to between 360 and 420 lbf.in. (4.07 m.daN and 4.7 m.daN).

(c)Connect electrical lead (1) on igniter plug.

(d)TORQUE coupling nut (2) to between 100 and 105 lbf.in. (1.13 and 1.19 m.daN)

(e)Safety coupling nut (2) with lockwire.

(f)Remove blanking cap and plug and connect electrical connector P4 (5).

(4)Test

(a)Start APU (Ref. 49-10-00, P. Block 501).

(b)Listen for igniter plug firing.

(c)Check start time is in limits.

(d)Shut down APU.

(5)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Close access doors 315AL and 316AR and remove access platform.

2. Inspection

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)

B. Procedure

(1)Job Set-Up

(a)Position access platform and open access doors 315AL and 316AR.

WARNING: IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(b)Remove igniter plug (Ref. Para. 1.).

(2)Inspection

(a)Visually inspect igniter plug for broken or missing parts. Shake plug and listen for rattling noise. Replace igniter plug, if necessary.

(b)Inspect igniter plug for internal wear and breakdown. (Ref. Fig. 202)

1 Inspect center electrode and outer shell for erosion. If the distance between edge of electrode and inside of uneroded edge of ground shell tip exceeds 0.090 in. (2.3 mm) as shown in figure, replace plug. Uniform erosion on electrode and outer shell is acceptable.

2 Inspect ceramic insulator for cracks or chipped area as shown in figure. Replace igniter plug if ceramic insulator is damaged.

3 Inspect outer shell for burned or flowed metal as shown in figure. Replace plug if metal is burned or flowed.

4 Inspect grommet mating flange of igniter plug for grooving. If grooved on one side 0.03 in. (0.77 mm) deep or more, replace plug.

5 Inspect electrical connector for bent or burned pin. Replace igniter plug if pin is damaged.

6 Inspect threaded portions of igniter plug for crossed, galled, peened or stripped threads. Replace igniter plug if threads are damaged.

7 Inspect for clogged annular passage between insulator and outer shell. If clogged, carry out cleaning procedure (Ref. Para. 3.).

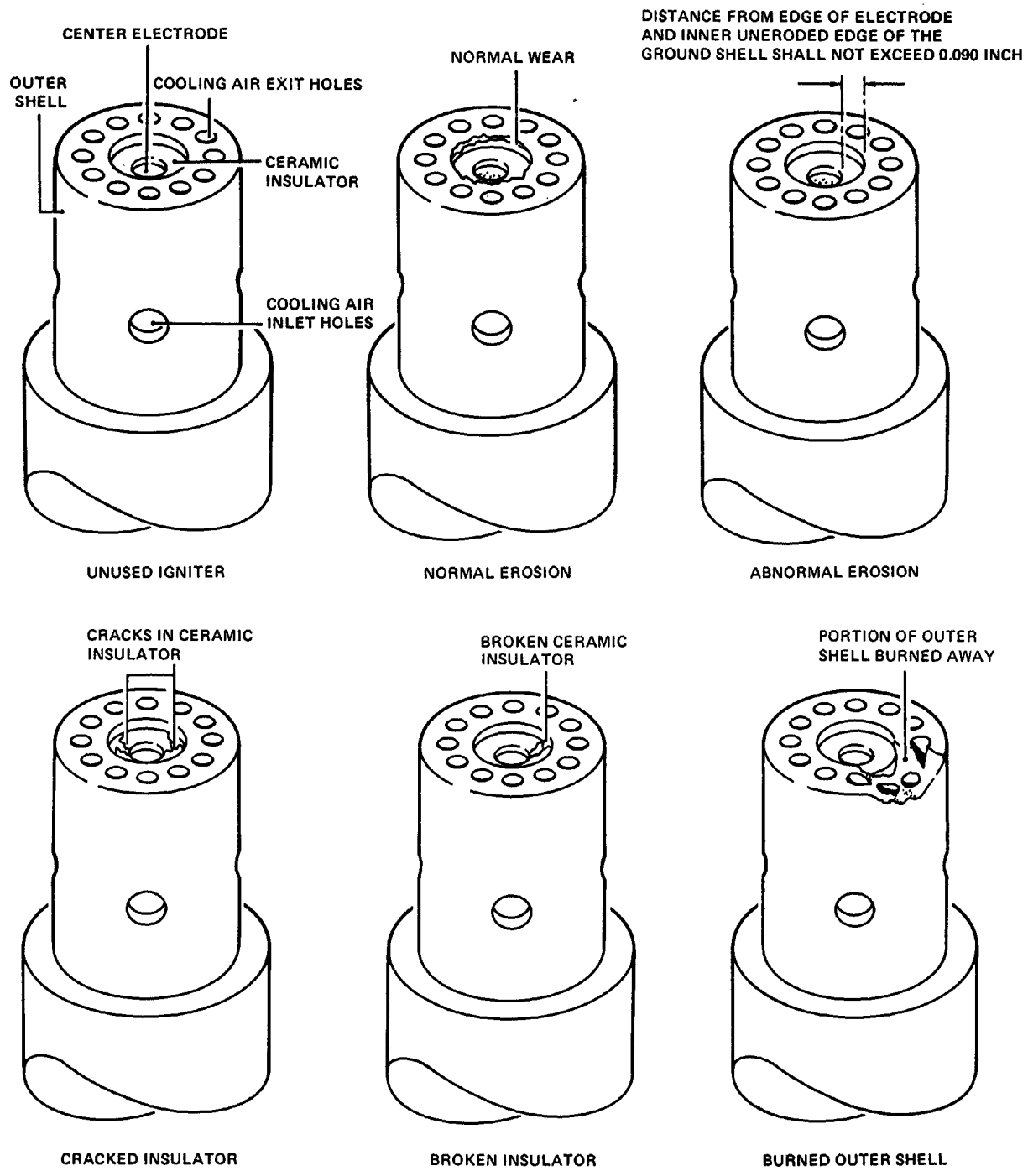
(3)Close-Up

(a)Install and test igniter plug (Ref. Para. 1.)

(b)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(c)Close access doors 315AL and 316AR and remove access platform.

(d)Remove safety clips and tags close circuit breakers 50KA, 1KD, 58KD and 71KD.


CENTER ELECTRODE
OUTER SHELL
COOLING AIR EXIT HOLES
CERAMIC INSULATOR
COOLING AIR INLET HOLES
UNUSED IGNITER
NORMAL WEAR
NORMAL EROSION
DISTANCE FROM EDGE OF ELECTRODE AND INNER UNERODED EDGE OF THE GROUND SHELL SHALL NOT EXCEED 0.090 INCH
ABNORMAL EROSION
CRACKS IN CERAMIC INSULATOR
CRACKED INSULATOR
BROKEN CERAMIC INSULATOR
BROKEN INSULATOR
PORTION OF OUTER SHELL BURNED AWAY
BURNED OUTER SHELL
B M 6 49 42 12 2 AC M 0-14

Igniter Plug - Inspection
Figure 202

3. Cleaning

WARNING: USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT (MAT. NO. 11-002). SOLEVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
(4)	Abrasive Cabinet Plug Cleaner
(5)	Stiff-Bristle Brush

B. Procedure

(1)Job Set-Up

(a)Position access platform and open access doors 315AL and 316AR.

WARNING : IGNITION SYSTEM HIGH CURRENT AND VOLTAGE CAN KILL YOU. DISCONNECT THE LOW TENSION SUPPLY AND WAIT A MINIMUM OF 5 MINUTES BEFORE YOU WORK ON THE SYSTEM. GROUND THE IGNITER LEAD AFTER YOU DISCONNECT IT, USE A TOOL WITH AN INSULATED HANDLE.

(b)Remove igniter plug (Ref. Para. 1.)

(2)Cleaning

NOTE : Igniter plug shall be cleaned just enough to remove carbon deposits.

(a)Remove carbon deposits with stiff bristle brush or by using an abrasive cabinet plug cleaner.

WARNING : CLEANING AGENT MAT. NO 11-002 IS DANGEROUS.

(b)Wipe clean with cleaning agent (Mat. No. 11-002).

(3)Close-Up

(a)Install and test igniter plug (Ref. Para. 1.)

(b)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(c)Close access doors 315AL and 316AR and remove access platform.

(d)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

1. Removal/Installation

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Protective Covers
(4)	O-Rings
(5)Material No. 03-002	Oils (Ref. 20-31-00)
or	
(6)Material No. 03-003	Oils (Ref. 20-31-00)
(7)	Torque Wrench, up to 1 m.daN (88.5 lbf.in.)
Referenced Procedure	
- 49-42-14, P. Block 401	Starter Sprag Clutch

B. Procedure

R (Ref. Fig. 201)

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

(2)Removal

(a)Remove nuts (1, 5) washers (2, 6) and disconnect electrical connections negative 8KA (-)(7), and 8KA (+) resistor assembly (3).

(b)Release clamp (12) and remove starter motor (10).

(c)Remove and discard O-ring (11).

(d)Fit protective covers to gearbox aperture and starter motor.

(3)Preparation for Installation

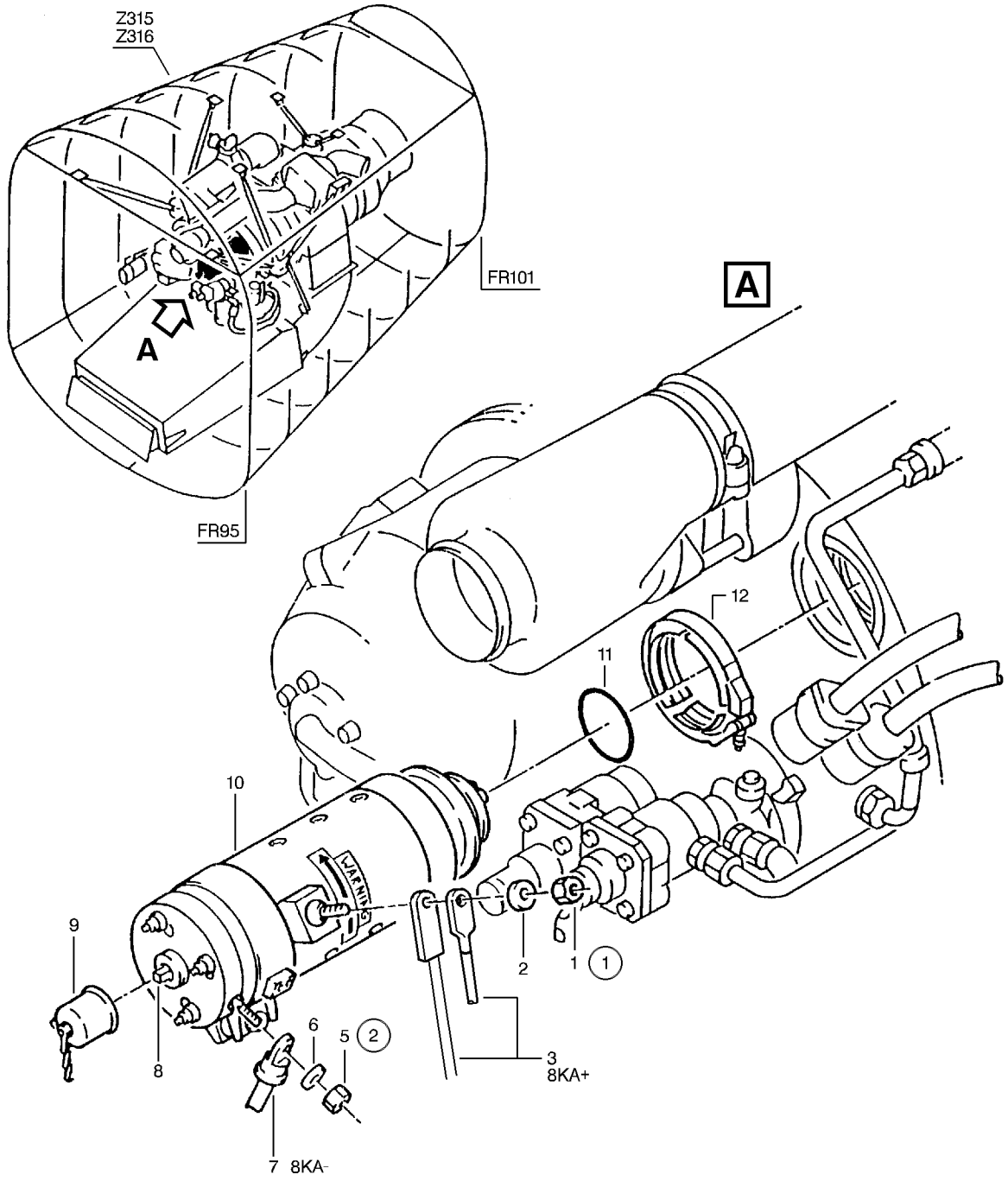
(a)Check starter motor for brush wear.

NOTE : Protrusion of indicator peg varies directly with brush wear. If indicator peg does not protrude, replace starter motor.

(b)Remove protective covers and inspect flanges of starter motor and gearbox for damage.

(c)Inspect starter motor shaft splines for damage.

(d)Check starter sprag clutch and area for damage.



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NOTE:

(1) TORQUE TO BETWEEN 0.85 AND 0.90 m.daN (75 AND 80 lbf.in.)

(2) TORQUE TO BETWEEN 0.56 AND 0.62 m.daN (50 AND 55 lbf.in.)

Starter Motor
P/N 519858-4 and Subsequent
Figure 201

R

(e)Make certain that starter motor splined shaft has a thin layer of oil.

(4)Installation
(a)Apply a thin layer of oil (Mat. No. 03-002 or 03-003) to O-ring (11).
(b)Install O-ring (11) on starter motor (10).
(c)Remove protective cap (9).
CAUTION : DO NOT DAMAGE STARTER SPRAG CLUTCH DURING INSTALLATION.
(d)Position starter motor (10) in gearbox.
NOTE : Make certain that the starter motor alignment pin engages in the gearbox alignment hole.
(e)Install clamp (12) and TORQUE to between 0.56 and 0.62 m.daN (50 and 55 lbf.in.).
(f)Slowly rotate starter motor CCW (with a spanner on the square end of driveshaft) until sprag clutch engages and APU spool is rotating.
(g)Make certain that sprag clutch does not slip.
(h)Slowly rotate the starter motor CW.
(j)Make certain the sprag clutch disengages easily allowing the starter motor to rotate freely.
NOTE : Replace sprag clutch (Ref. 49-42-14, P. Block 401) if necessary.
(k)Install protective cap (9).
(l)Install electrical 8KA (+) resistor assembly (3) with washer (2) and nut (1).
(m)TORQUE nut (1) to between 0.85 and 0.90 m.daN, (75 and 80 lbf.in.)
NOTE : Make certain that negative terminal post is tight in starter motor before connecting terminal.
(n)Install electrical connection 8KA(-)(7) with washer (6) and nut (5).
R (p)TORQUE nut (5) to between 0.56 and 0.62 m.daN. (50 and 55 lbf.in.)

(5)Test
(a)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 2KD, 58KD and 71KD.
(b)Carry out starter motor functional test (Ref. Para. 2.).
(6)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

2. Functional Test

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE AND ADEQUATE.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz

Referenced Procedures

- 23-44-00, P. Block 1	Cabin and Service Interphone
- 24-41-00, P. Block 301	AC External Power Control
- 49-10-00, P. Block 501	Power Plant
- 49-42-14, P. Block 401	Starter Sprag Clutch

B. Procedure

(Ref. Fig. 201)

(1)Job Set-Up

(a)Position access platform and open access doors 315AL and 316AR.

(b)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(d)Connect service interphone (Ref. 23-44-00, P. Block 1).

(2)Test

(a)Remove protective cap.

CAUTION : SHUT DOWN APU IMMEDIATELY IF STARTER SPRAG CLUTCH DOES NOT DISENGAGE AFTER STARTER MOTOR IS DE-ENERGIZED.

(b)Start and operate APU (Ref. 49-10-00, P. Block 501).

(c)Check on manual driveshaft that starter sprag clutch disengages after starter motor is de-energized.

NOTE : If starter sprag clutch does not disengage, clutch must be replaced (Ref. 49-42-14, P. Block 401).

(d)Shut down APU (Ref. 49-10-00, P. Block 501).

(e)Install protective cap.

(3)Close-Up

(a)Disconnect service interphone (Ref. 23-44-00, P. Block 1).

(b)Disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

(c)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(d)Close access doors 315AL and 316AR.

(e)Remove access platform.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C. 291051-1	Starter Clutch Installation Tool
D. 294871-3	Bearing Driver
E. 298096-1	Starter Clutch Puller
F. 298096-2	Starter Clutch Puller
G. 833052-1	Starter Clutch Bearing Installation Driver
or	for use with Bearing P/N 892575-1
H. 833052-2	Starter Clutch Bearing Installation Driver
	for use with Bearing P/N 3614423-1
J. 833207-1	Gear Alignment Tool (part of kit)
K. Material No. 03-002	Oils (Ref. 20-31-00)
or	
L. Material No. 03-003	Oils (Ref. 20-31-00)
Referenced Procedure	
- 49-42-13, P. Block 201	Starter Motor
- 49-52-11, P. Block 401	Cooling Fan

2. Procedure

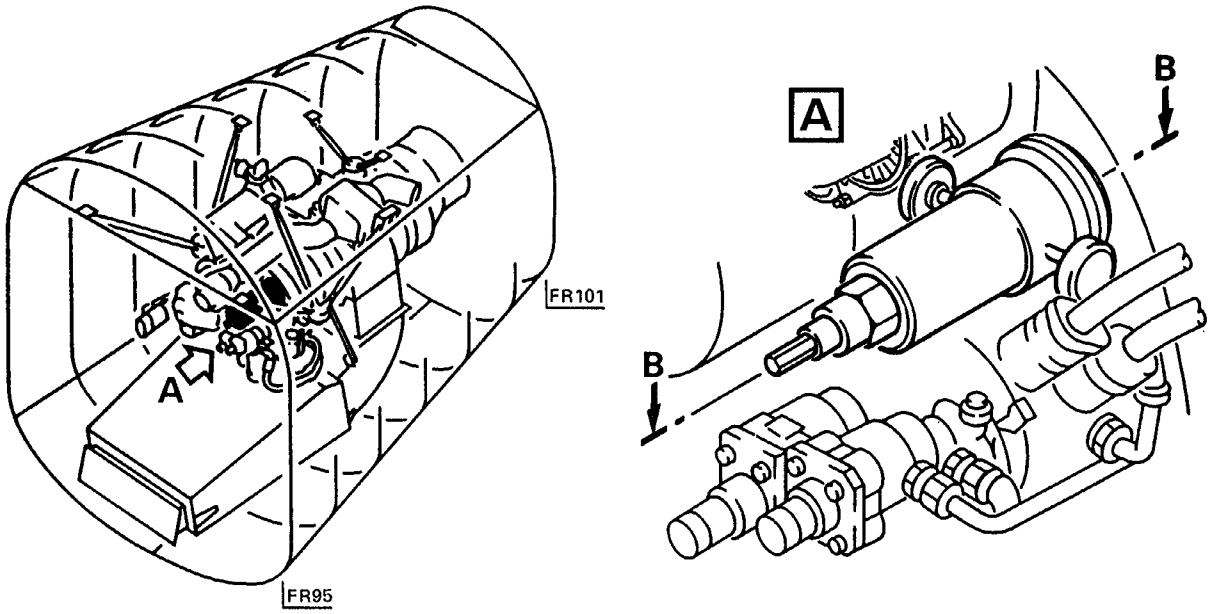
(Ref. Fig. 401)
(Ref. Fig. 402)
(Ref. Fig. 403)
(Ref. Fig. 404)
(Ref. Fig. 405)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.
(3)Remove cooling fan exhaust duct (Ref. 49-52-11, P. Block 401).
(4)Remove starter motor (Ref. 49-42-13, P. Block 201).
R (5)Remove and discard O-ring (7).



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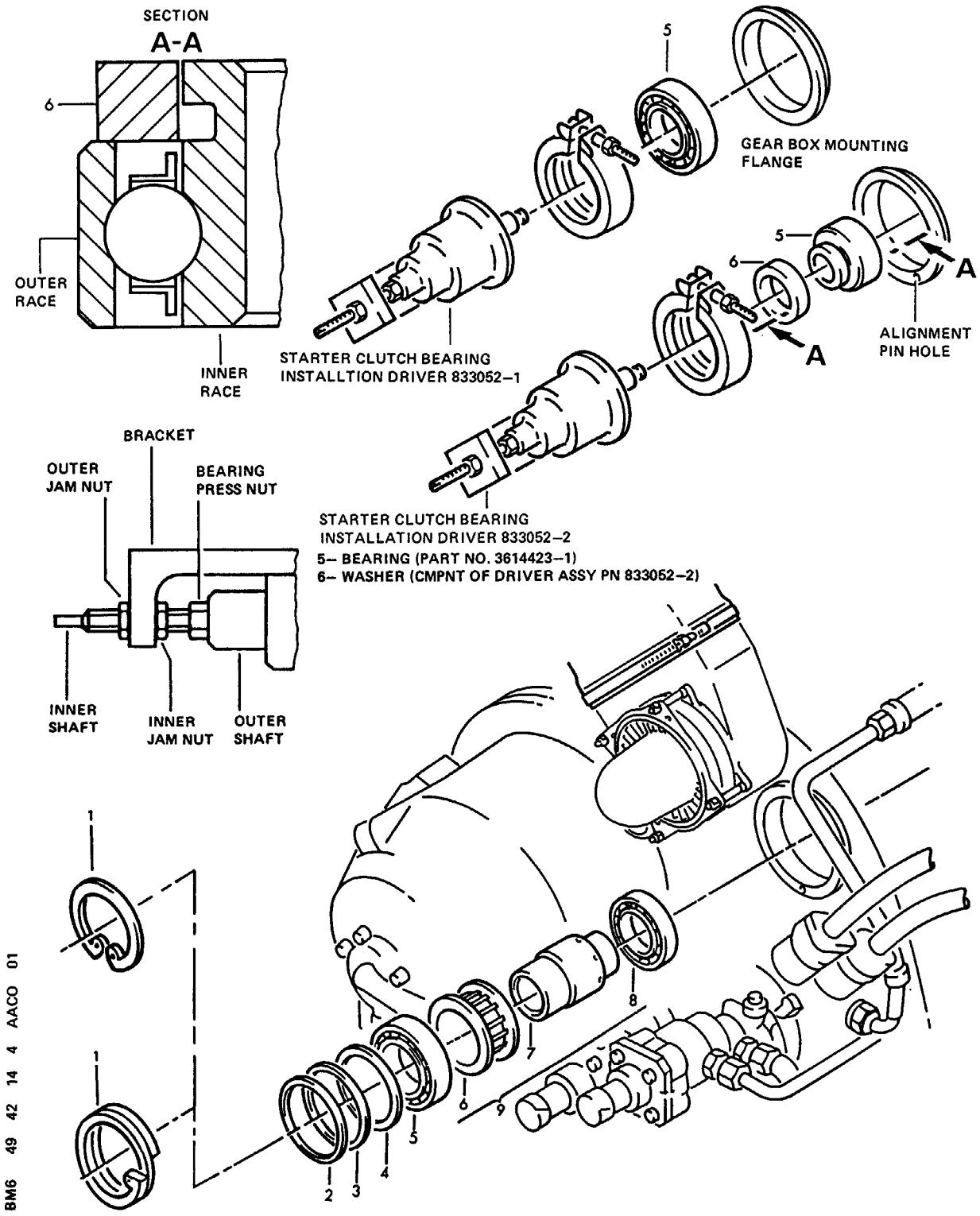
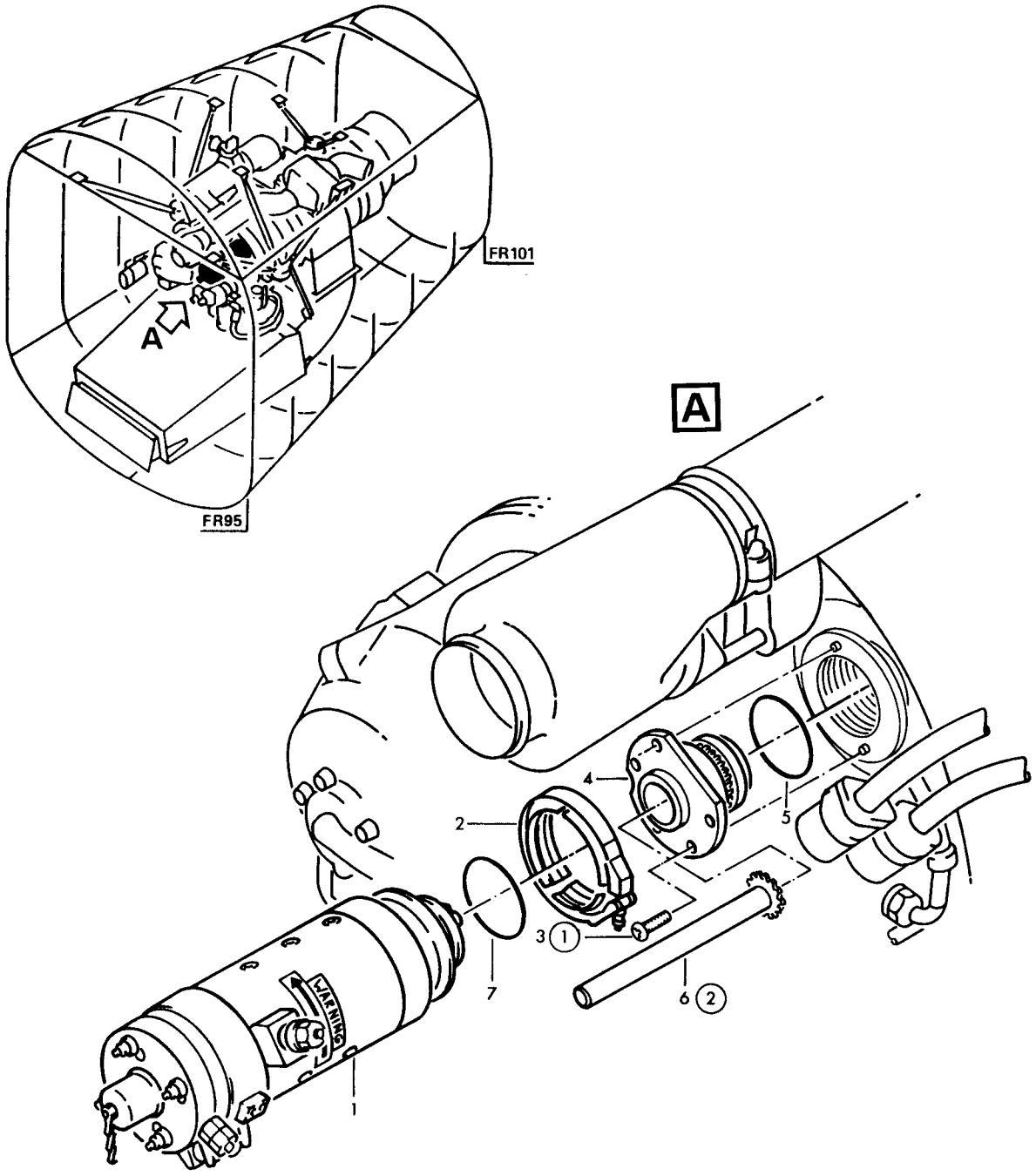
Starter Clutch Removal
Figure 401



Starter Clutch Removal/Installation
Figure 402

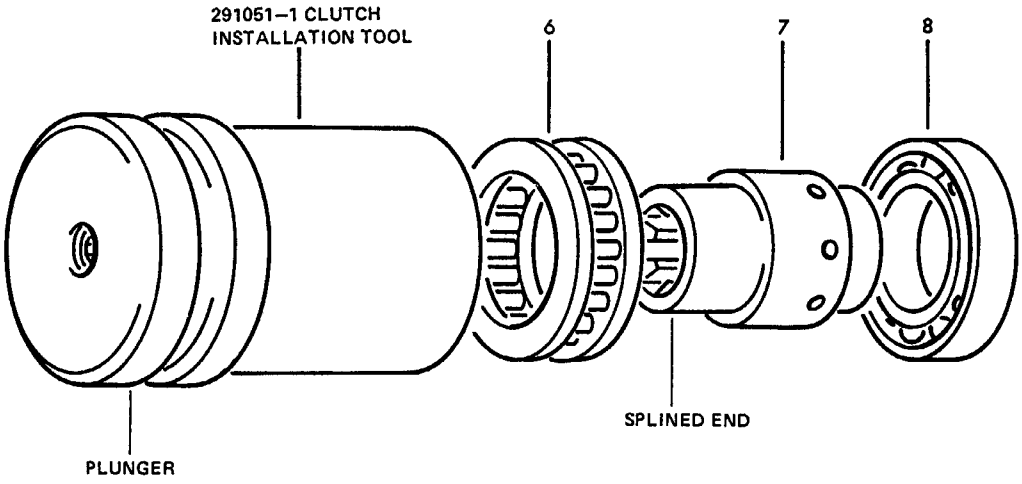


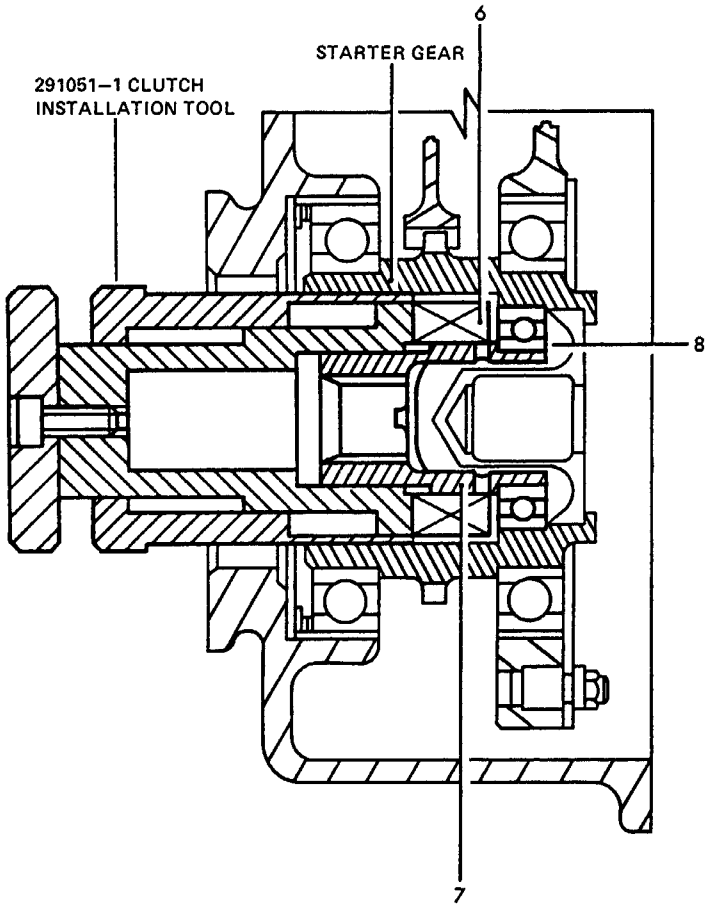
NOTE: (1) TORQUE TO BETWEEN 110 AND 120 lbf. in. (1.24 AND 1.35 m. daN)
(2) GEAR ALIGNMENT TOOL

BM6 49 42 14 4 AAEO 02

LRU Starter Clutch Assembly
Figure 403

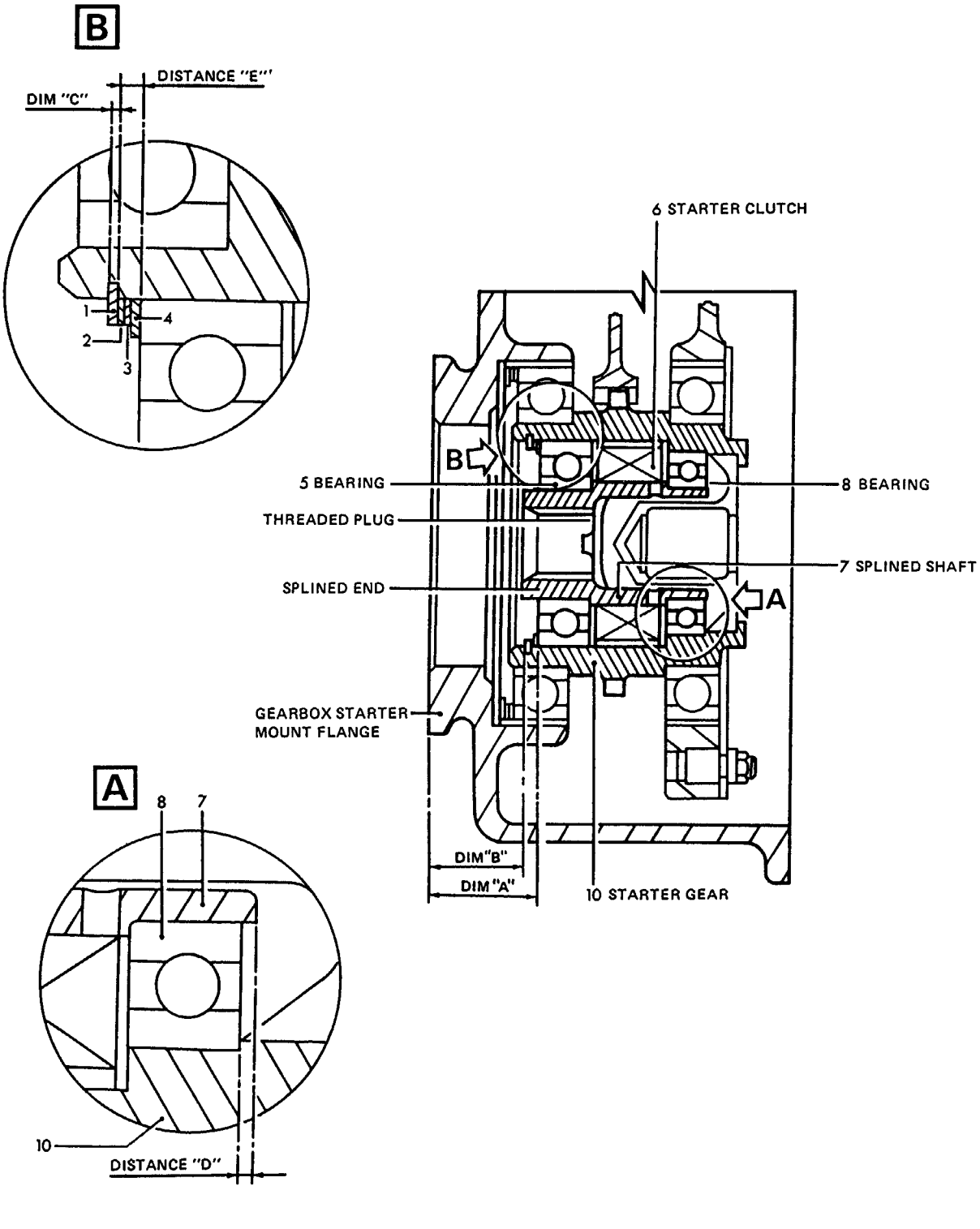
R





BM6 49 42 14 4 AAGO 01

Starter Clutch Installation
Figure 404



Starter Clutch Installation
Figure 405

**Clutch without threaded plug

B. Removal (Ref. Fig. 401, 402).
(1)Measure distance from surface of starter mounting flange to outer surface of retaining ring (1) and record as dimension 'B' (Ref. Fig. 405).
(2)Remove retaining ring (1) and shims (2, 3).
(3)Remove and discard spring washer (4).
(4)Remove starter clutch assembly (9) using starter clutch puller P/N 298096-1.
(a)Make certain that tangs of clutch puller are fully retracted and knurled screws are loose.
(b)Insert clutch puller into splined shaft (7) until it bottoms on oil plug.
(c)Tighten knurled screws to stop rotation of shaft.
(d)Expand tangs by turning inner shaft nut clockwise.
(e)Turn outer shaft nut clockwise until starter clutch assembly is free.

**Clutch with threaded plug

B. Removal (Ref. Fig. 401, 402).
(1)Measure distance from surface of starter mounting flange to outer surface of retaining ring (1) and record as dimension 'B' (Ref. Fig. 405).
(2)Remove retaining ring (1) and shims (2, 3).
(3)Remove and discard spring washer (4).
(4)Remove starter clutch assembly (9) using starter clutch puller P/N 298096-2.
(a)Make certain that shaft of clutch puller is fully retracted and knurled screws are loose.
(b)Position clutch puller onto starter mounting flange and secure with starter motor attaching clamp.
(c)Screw shaft of clutch puller into plug of splined shaft.
(d)Tighten knurled screws to stop rotation of shaft.
(e)Turn outer shaft nut clockwise until starter clutch assembly is free.
(f)Remove clamp, clutch puller and clutch assembly.

**LRU clutch assembly

B. Removal (Ref. Fig. 403).
CAUTION : THE CLUTCH ASSEMBLY IS A TIGHT FIT IN GEARBOX HOUSING, USE STARTER MOTOR TO LOOSEN. DO NOT COMPLETELY REMOVE CLUTCH ASSEMBLY WITH STARTER MOTOR.
(1)Remove clutch assembly retaining screws (3).
(2)Refit starter motor (1) to clutch assembly (4) and attach with clamp (2).
(3)Pull starter motor (1) to free clutch assembly (4).
(4)Support starter motor (1) and remove clamp (2).
(5)Remove starter motor (1) from clutch assembly (4).
(6)Remove clutch assembly (4) from gearbox housing.
(7)Remove and discard O-ring (5).

C. Preparation for Installation

CAUTION : MAKE CERTAIN, THAT GEARBOX IS NOT CONTAMINATED WHEN CLEANING.

(1)Clean and inspect gearbox flange, starter gear and area for damage.

NOTE : The reason for any metal particles found must be investigated.

(2)Inspect starter clutch for damage, replace if necessary.

(3)Check starter clutch engagement area for damage.

NOTE : Engagement area must be smooth or starter clutch life will be reduced.

D. Installation (Ref. Fig. 402, 404)

(1)Lubricate starter clutch (6), splined shaft (7) and bearing (8) with engine oil (Mat. No. 03-002 or Mat. No. 03-003).

(2)Install bearing (8) on splined shaft (7) using bearing driver 294871-3.

NOTE : Make certain that the engraved 'OUT' on surface of bearing (8) faces unsplined end of splined shaft (7).

(3)Check splined shaft (7) protrudes through bearing (8) for distance 'D' 0.38 ±0.13 mm (0.015 ±0.005 in.)(Ref. Fig. 405).

(4)Position starter clutch (6) onto splined shaft (7) with engraved arrow facing splined end of shaft.

(5)Position splined shaft (7) with installed bearing (8) and starter clutch (6) into starter clutch installation tool P/N 291051-1.

(6)Place clutch installation tool with clutch assembly into position in starter gear.

NOTE: Make certain that leading edge of clutch installation tool bottoms on starter gear.

(7)Support clutch installation tool and press plunger to push clutch assembly (9) into installed position.

(8)Carefully remove clutch installation tool.

NOTE : Make certain that starter clutch assembly remains in position.

(9)Check starter sprag clutch for function.

(a)Hold starter clutch in installed position and rotate splined shaft (7) counterclockwise. Starter clutch must engage.

(b)Hold starter clutch in installed position and rotate splined shaft (7) clockwise. Starter clutch must disengage.

CAUTION : MAKE CERTAIN THAT STARTER CLUTCH ASSEMBLY IS STILL IN INSTALLED POSITION.

(10)Lubricate bearing (5) with engine oil (Mat. No. 03-002 or Mat. No. 03-003).

(11)Position bearing (5) on splined shaft (7) with the engraved 'OUT' visible.

NOTE : Bearing will not completely seat.

(12)Preparation of starter clutch bearing installation driver P/N 833052-1 or P/N 833052-2 (Ref. Fig. 402).
(a)Fully retract inner and outer shaft.
(b)Position clutch bearing installation driver onto starter mounting flange and secure with clamp.
NOTE : Make certain that alignment pin of clutch bearing installation driver engages with starter mounting flange alignment hole.

CAUTION : MAKE CERTAIN THAT STARTER CLUTCH ASSEMBLY (9) IS NOT PULLED OUT OF POSITION WHEN SCREWING INNER SHAFT INTO PLUG OF SPLINED SHAFT (7).
(c)Screw inner shaft into plug of splined shaft (7).
(d)Hand tighten inner and outer jam nuts to bracket.

CAUTION : TO AVOID DAMAGING APU GEARBOX, DO NOT OVERTORQUE BEARING PRESS NUT DURING INSTALLATION OF BEARING (5).
(13)Install bearing (5) with bearing installation driver (Ref. Fig. 402).
(a)Rotate bearing press nut until driver contacts surface of bearing (5).
(b)Press bearing (5) onto splined shaft (7) by rotating bearing press nut, stop when resistance is felt.
(c)Loosen inner and outer jam nuts.
(d)Unscrew inner shaft out of plug of splined shaft (7).
(e)Fully retract inner and outer shaft.
(f)Remove clamp and clutch bearing installation driver.
(14)Check that bearing (5) is correctly seated (Ref. Fig. 405).
(a)Measure distance 'E' between outer surface of bearing (5) and groove of retaining ring (1).
Distance 'E' should be approx. 2.03 mm (0.08 in.).
(15)Shim measuring method:
(a)Measure distance from surface of starter mounting flange to outer surface of bearing (5). Record as dimension 'A'.
(b)Measure thickness of retaining ring (1). Record as dimension 'C'.
(c)Add dimensions 'B' (Ref. Para. 2. B.) and 'C' then subtract from 'A'. Record as dimension 'X'.
(d)Subtract 1.15 mm (0.045 in.) from dimension 'X', the result is thickness 'Y', the required shims (2, 3).
Example:
DIM. 'A'
- DIM. ('B' + 'C')
= DIM. 'X' mm (in.)
- 1.15 mm (0.045 in.)
= Thickness 'Y' mm (in.)
(e)Select shims (2, 3) to obtain calculated thickness 'Y'.
(f)A tolerance of +0.08, -0.06 mm. (+0.003, -0.002 in.) to calculated thickness 'Y' is permitted.
(16)Install new spring washer (4) and selected shims (2, 3) (Ref. Fig. 402).
CAUTION : MAKE CERTAIN RETAINING RING (1) IS CORRECTLY SEATED.
(17)Install retaining ring (1).

**LRU clutch assembly

D. Installation (Ref. Fig. 403).
(1)Lubricate new O-ring (5) with oil (Mat. No. 03-002 or 03-003).
(2)Install new O-ring (5) on clutch assembly (4).
(3)Align gears of the clutch assembly (4) and gearbox with the gear alignment tool (6).
(4)Install clutch assembly (4) into the gearbox housing.
(5)Install clutch assembly retaining screws (3).
(6)TORQUE screws (3) to between 1.24 and 1.35 m.daN. (110 and 120 lbf.in.).

E. Test
(1)Check function of starter clutch
(a)Make certain that starter clutch engages without slipping when rotating splined shaft (7) counterclockwise.
(b)Make certain that starter clutch disengages when rotating splined shaft (7) clockwise and rotation of bearings and clutch is smooth and without drag.
R (2)Lubricate new O-ring (7) with oil (Mat. No. 03-002 or 03-003).
R (3)Install new O-ring (7) on starter motor.
R (4)Install starter motor (Ref. 49-42-13, P. Block 201).
R (5)Install cooling fan exhaust duct (Ref. 49-52-11, P. Block 401).
R (6)Carry out functional test of starter motor (Ref. 49-42-13, P. Block 201).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

1. General

A. The APU air system provides the aircraft pneumatic system with sufficient air for all conditions.
It consists of:

(1) Bleed and Surge Air System (Ref. 49-51-00)
The APU bleed and surge air system provides bleed air for Main Engine Start (MES), for operating the Environmental Control System (ECS) and for the deicing system (Deice).
The bleed air, which is delivered by the load compressor, is ducted to the aircraft pneumatic system via the bleed load valve. When no APU bleed air is required with APU running, the bleed load valve and Inlet Guide Vanes (IGV) are closed, and the remaining air is routed to the APU exhaust, modulated by the surge control valve.

(2) Accessory Cooling System (Ref. 49-52-00)
The APU cooling air and ventilation system provides air for cooling the APU oil system and ventilation of the APU compartment. The cooling air system consists of a fan shutoff valve, gearbox-driven cooling fan, oil cooler and associated ducting.

(3) Gearbox Pressurization System (Ref. 49-26-00)
The gear drives installed in the gearbox reduce the turbine speed to drive the accessory units.
The gearbox pressurization system regulates the seal buffering air flow and provides and maintains the gearbox pressure for APU operation above 15,000 ft.

(4) Load Compressor Control System (Ref. 49-23-00)
The load compressor provides sufficient bleed air for the aircraft pneumatic system. The airflow is controlled by modulating the IGV. The load compressor output is regulated by the IGV dependent on aircraft system demand (Ref. 49-51-00).

BLEED AND SURGE AIR - DESCRIPTION AND OPERATION

1. General

The APU bleed and surge air system provides bleed air for Main Engine Start (MES), for operating the Environmental Control System (ECS) and for the De-Icing System (De-Ice).

The bleed air, which is delivered by the load compressor, is ducted to the aircraft pneumatic system via the bleed load valve. When no APU bleed air is required with APU running, the bleed load valve and Inlet Guide Vanes (IGV) are closed, and the remaining air is routed to the APU exhaust, modulated by the surge control valve.

2. Component Location

(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	VALVE-APU BLEED LOAD		316	316AR	49-51-11
	VALVE-SURGE CONTROL		316	316AR	49-51-13
	VANES-INLET GUIDE		316	316AR	
	ACTUATOR-INLET GUIDE VANE		316	316AR	49-23-13
	DUCT-SURGE AIR		316	316AR	49-51-16
	DUCT-SURGE/BLEED		316	316AR	49-51-17
	SENSOR-STATIC PRESSURE		316	316AR	49-51-15
	SENSOR-TOTAL PRESSURE		316	316AR	49-51-14
	TRANSDUCER-DELTA PRESSURE		316	316AR	49-51-18
	TRANSDUCER-TOTAL PRESSURE		316	316AR	49-51-19
7HV	FLOWBAR/ANNUNCIATOR	436VU	212		
8HV	RELAY-LEAK R	103VU	121	121BL	
9HV	RELAY-LEAK APU	103VU	121	121BL	
10HV	RELAY-LEAK L	103VU	121	121BL	
14KD	SWITCH-APU MASTER	429VU	212		
15HV	RELAY-APU VALVE CTLD OPEN	103VU	121	121BL	
17HV	SWITCH-APU BLEED	436VU	212		
59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11

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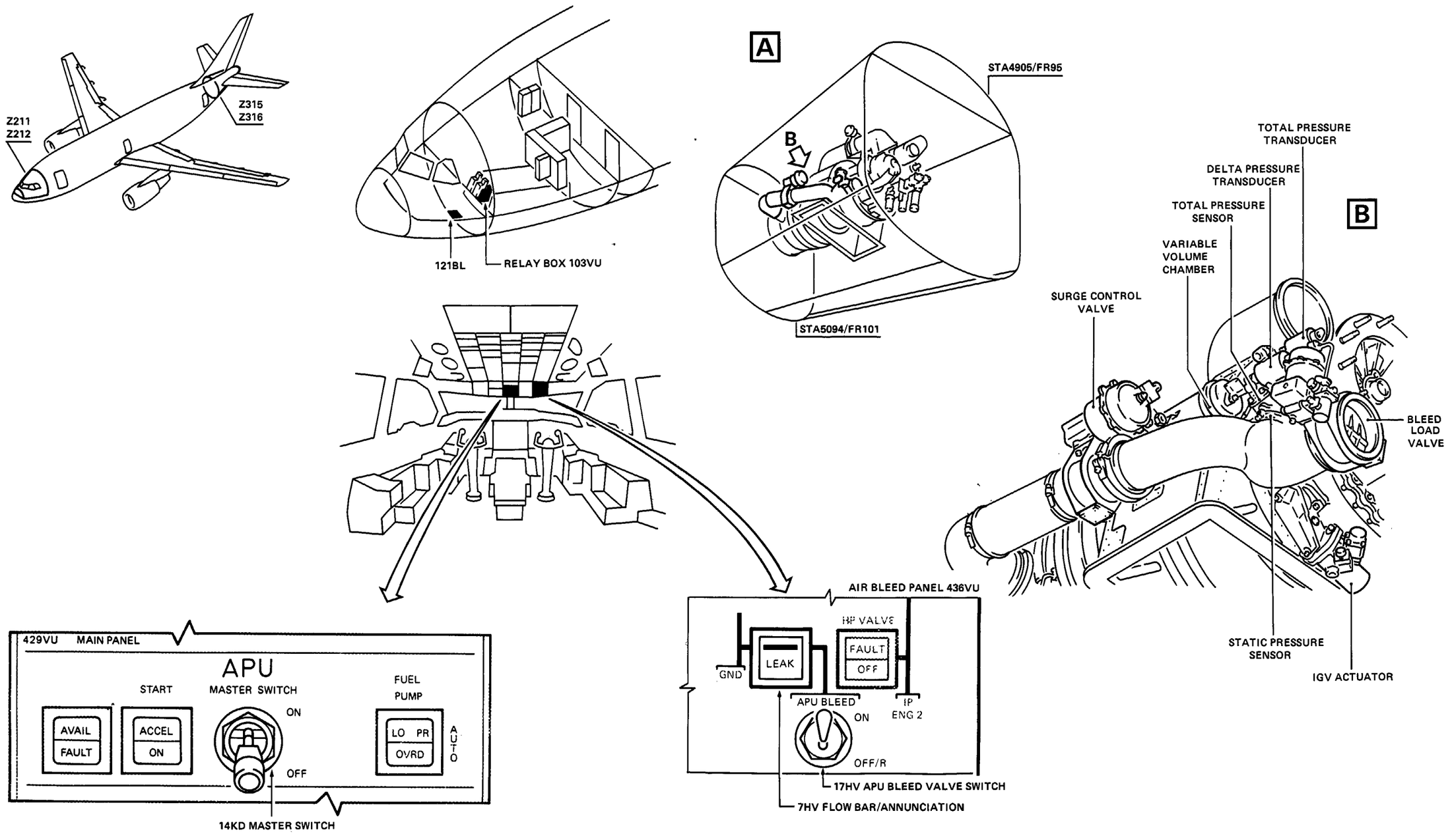


Bleed and Surge Air - Component Location
Figure 001

3. Description
(Ref. Fig. 001)

A. Bleed Air System
(1) The automatic bleed air system supplies and controls bleed air from the load compressor for the pneumatic system. It consists of a bleed load valve, Inlet Guide Vanes (IGV), Inlet Guide Vane Actuator (IGVA) and Load Compressor Inlet Temperature (LCIT) sensor.
(2) The Electronic Control Box (ECB) controls the IGVs in accordance with the required pneumatic modes:
- Idle
- ECS (Environmental Control System)
- MES (Main Engine Start)
- De-Ice
(3) When a mode is selected, the ECB positions the IGVs by sending a demand signal to the IGVA.
The Linear Variable Differential Transformer (LVDT) of the IGVA provides the feedback signal to the ECB. When the feedback signal matches the demand signal, the ECB provides a current signal to drive the torque motor to a zero position until a new command signal is generated.
(4) Reverse Flow Protection
To protect the APU from surge or stall conditions a Load Compressor Inlet Temperature (LCIT) sensor (T2 sensor) is installed in the load compressor housing on the lower left side of the APU.
The LCIT sensor is a dual element open bead alumel-chromel thermocouple that is used to monitor the inlet air temperature.
The temperature signal provides the ECB with an input signal for the surge control system, IGVs during ECS mode and for scheduling fuel for economical operation.
If the load compressor is in a surge or stall condition the inlet temperature increases at a rapid rate. The rate of temperature rise is monitored by the ECB and a RVRSE FLOW auto shutdown will occur.

B. Surge Control System
The surge control system vents air from the load compressor, which is not used for the aircraft pneumatic system, to the APU exhaust. It consists of a Surge Control Valve (SCV), static pressure sensor, total pressure sensor, delta pressure (ΔP) transducer, total pressure (PT) transducer, and a variable volume chamber.
Air from the load compressor is sampled by the static pressure sensor and transferred to the transducers.
The ΔP transducer and the PT transducer send signals to the ECB and the surge schedule in the ECB controls the SCV (Ref. 49-61-00).

4. Component Description

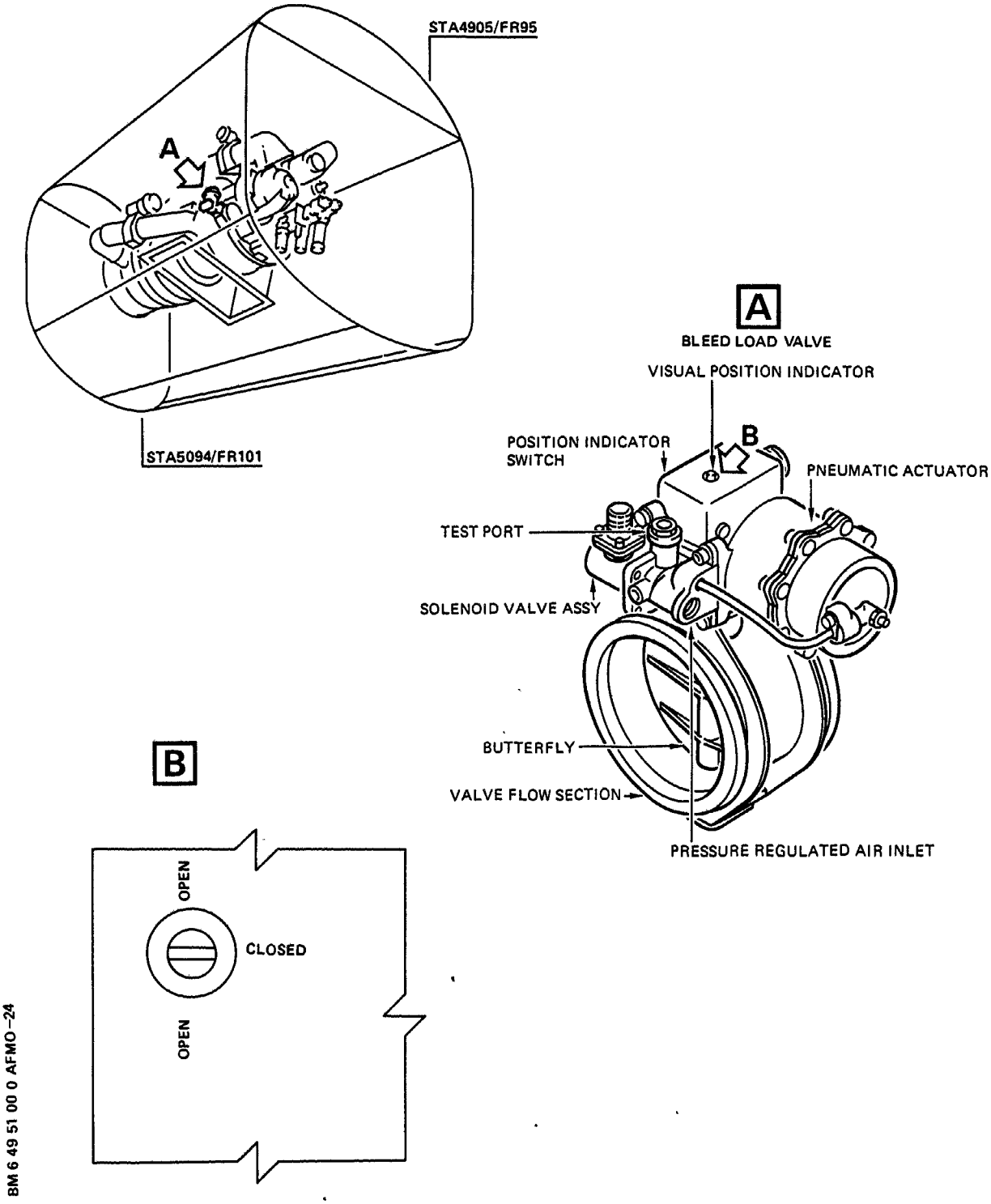
A. Bleed Load Valve
(Ref. Fig. 002)
The bleed load valve is a spring loaded closed, shutoff valve. It consists of a butterfly, pneumatic actuator, solenoid valve, position switch and a visual position indicator.
When the solenoid is energized the actuator is pressurized to 40 psig, from the surge control valve regulator, which opens the valve.
When the solenoid is de-energized the actuator pneumatic pressure is vented to ambient and the spring maintains the butterfly valve in the closed position.

B. Inlet Guide Vanes (IGV) (Ref. 49-23-00)
The IGVs assembly consists of 28 radially articulated vanes located upstream of the load compressor impeller.
The fixed leading edge of each vane is part of the guide vane housing.
The trailing edge is movable. The travel range from fully open (-15 °). to fully closed (+85 °) is 100 degrees.

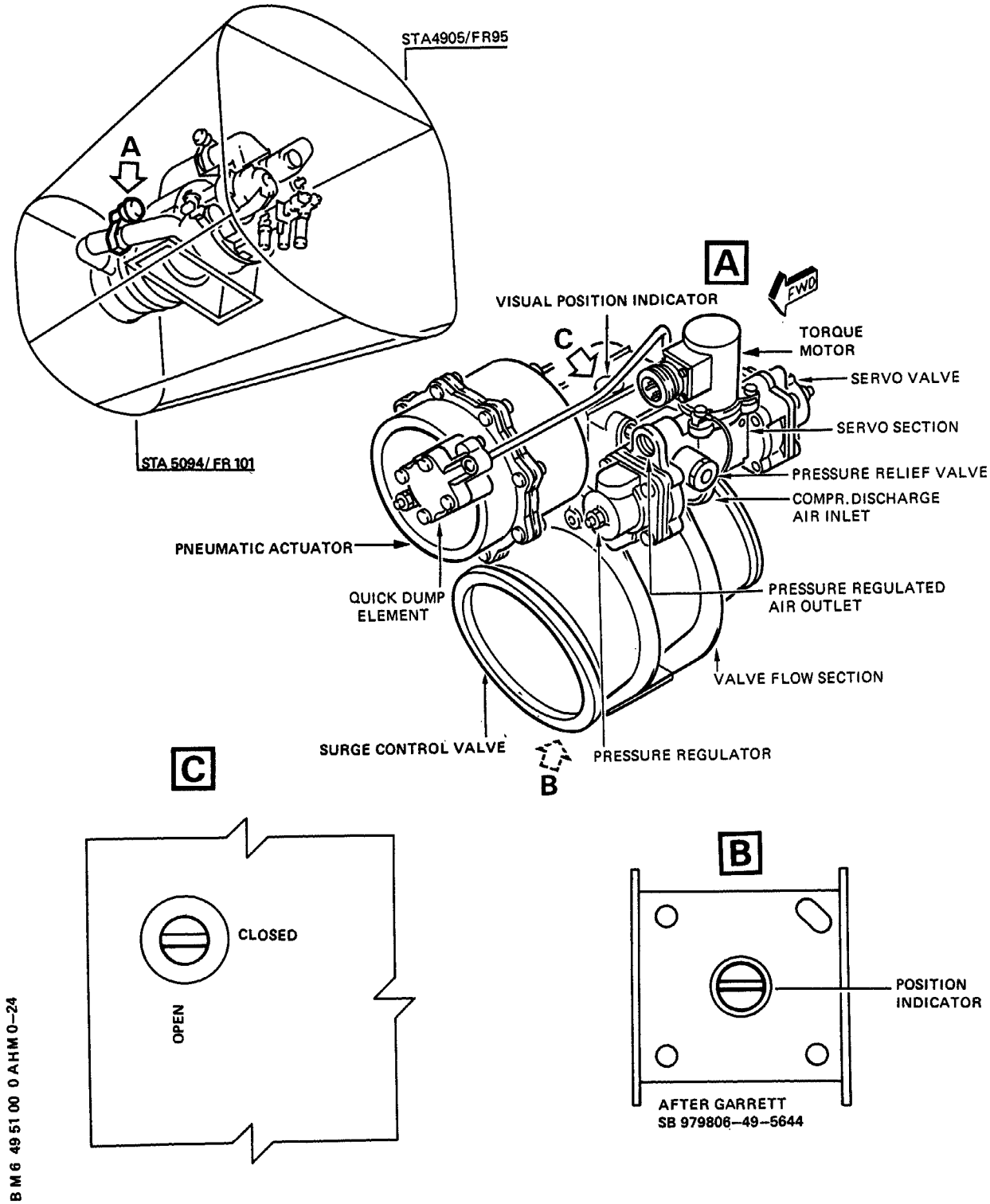
C. Inlet Guide Vane Actuator (IGVA)
The IGVA assembly controls the IGV position in response to an electrical signal from the ECB according to the ECB IGV control logic (Ref. 49-61-00).
The actuator is installed on lower side of the load compressor housing.
It consists of a torquemotor driven flapper nozzle, double acting piston servo spool and a LVDT. The actuator is powered by regulated pressure fuel from the fuel control unit (Ref. 49-30-00).

D. Surge Control Valve (SCV)
(Ref. Fig. 003)
The SCV valve is a spring loaded open, flow modulating valve and is located between the load compressor and the bleed load valve.
It consists of a butterfly flap, pneumatic actuator, servo valve, torque motor, pressure regulator, pressure relief valve and a quick dump element.
The pressure regulator supplies the SCV servo valve with regulated pressure from the compressor.
The ECB controls the torque motor according to the ECB surge control logic (Ref. 49-61-00). The torque motor controls the servo valve pressure, which operates the pneumatic actuator. The pressure relief valve protects the system against overpressurization. The quick-dump opens the SCV quickly, if necessary.

E. Pressure Sensors
(1) The total pressure sensor is a probe, installed in the load compressor scroll. It supplies bleed air total pressure to the total pressure transducer and to the delta pressure transducer.
(2) The static pressure sensor is an annular sensor with eight sampling ports and is installed between the load compressor outlet and the bleed surge duct. It provides the delta pressure transducer with static pressure.



Bleed Load Valve
Figure 002



Surge Control Valve
Figure 003

F. Transducers
(1)The delta pressure transducer converts the difference between the total and static pressure input into an electrical signal. It is located at the load compressor housing on the right of the APU.
(2)The total pressure transducer converts the total pressure into an electrical signal. It is located at the load compressor housing on the right side of the APU.

G. Variable Volume Chamber
(1)The variable volume chamber avoids damaging of the transducers and acts as a shock absorber. It consists of two chambers, divided by a diaphragm and is located at the load compressor housing on the right side of the APU.

H. ECB Function Adjustment Switches (Ref. 49-61-00)
(Ref. Fig. 004)
(1)The adjustment switches adjust the maximum limits of APU operating parameters for various modes. The switches are located under a protective cover on the front panel of the ECB.
The position of the adjustment switches are as follows:

S1 = ECS MIN	Position	A
S3 = ECS MAX NORM	Position	E
S5 = ECS COLD	Position	E
S2 = MES/DE-ICE	Position	E
S4 = COOLDOWN TIMER	Position	C
S6 = EGT	Position	E

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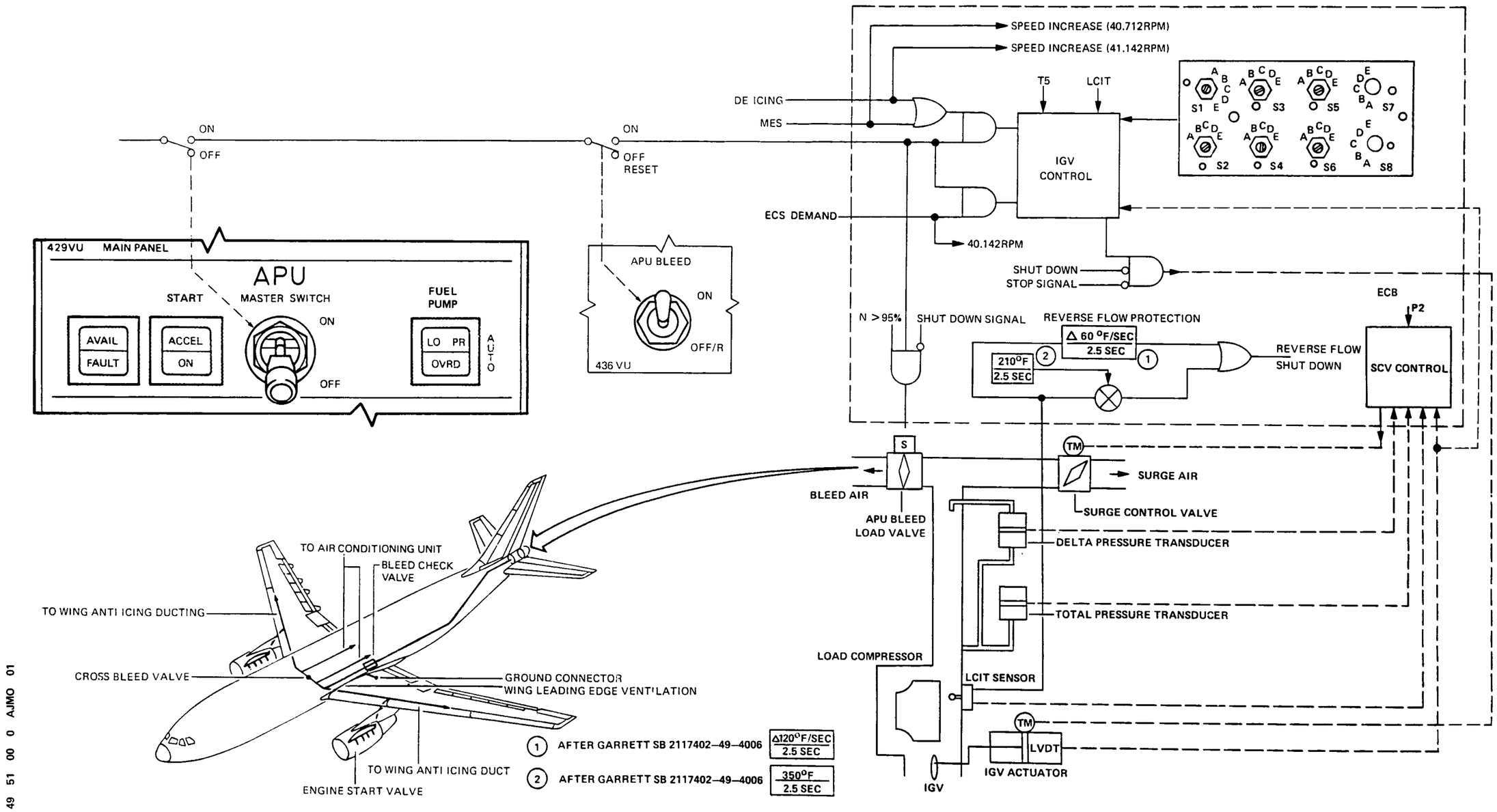

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Bleed and Surge Air
Figure 004

R

5. Operation

(Ref. Fig. 004)
(Ref. Fig. 005)

**ON A/C 101-200,

(Ref. Fig. 006)

**ON A/C 001-100,

(Ref. Fig. 007)

**ON A/C ALL

(Ref. Fig. 008)

A. APU MASTER SW 14KD is in ON position and APU start is initiated:
- During acceleration the ECB sends a signal to the IGVA to position the IGVs to fully closed.
- SCV is in open position.
- At 95 % RPM:
  . AVAIL indicator light 8KD comes on.

B. APU BLEED SWITCH 17HV in ON position
- The ECB provides a signal to open the bleed load valve.
- Flowbar 7HV comes on.
- On R ECAM display unit APU page selected (Ref. 49-70-00).
  . APU bleed valve symbol opens.
  . Duct pressure is indicated.
- The ECB controls the IGV position to provide sufficient pneumatic power.

C. For ECS mode
- APU speed 100 % RPM.
- The IGV position is modulated by an ECS demand signal in a range between ECS min. and ECS max. (Ref. 49-61-00).

D. For MES Mode
- APU speed increases to 101,4 % RPM.
- IGVs in fully open position.

E. For De-icing mode
- APU speed increases to 102,5 % RPM.
- IGVs in fully open position.

F. Reverse Flow Protection
The APU shuts down when the speed is more than 50 % RPM and one of the following conditions is present:

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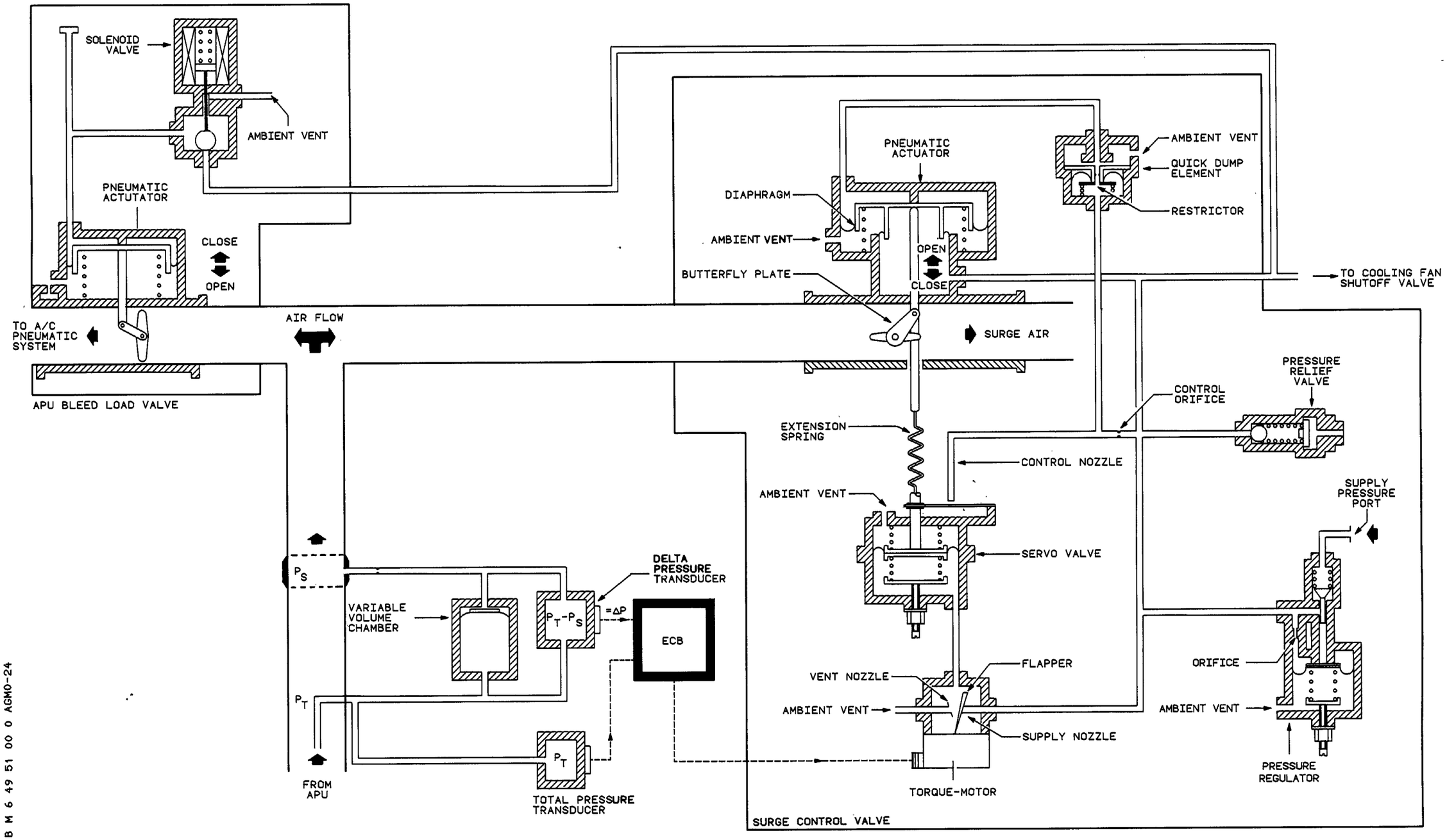

Bleed and Surge Air - Schematic
Figure 005

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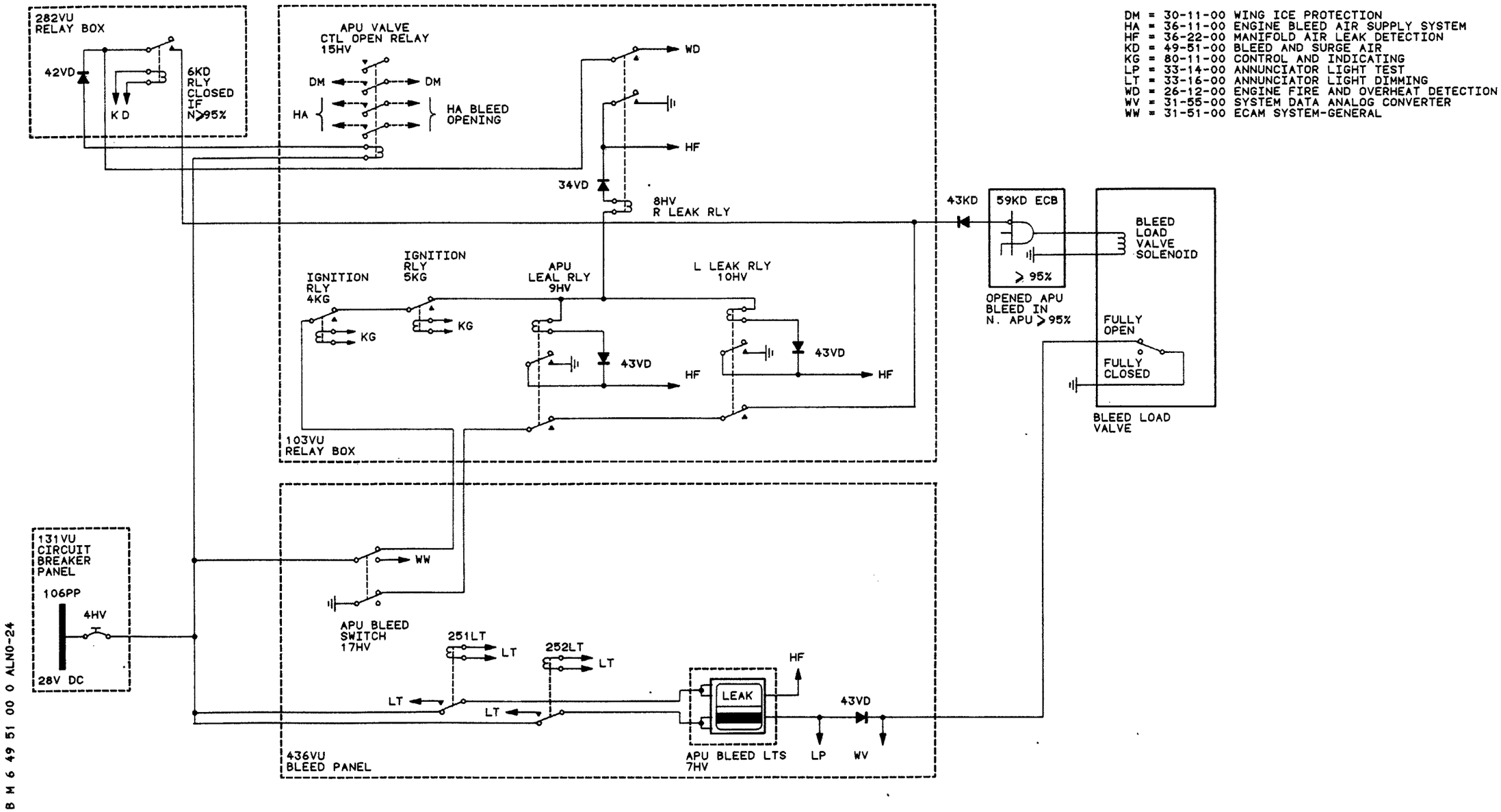
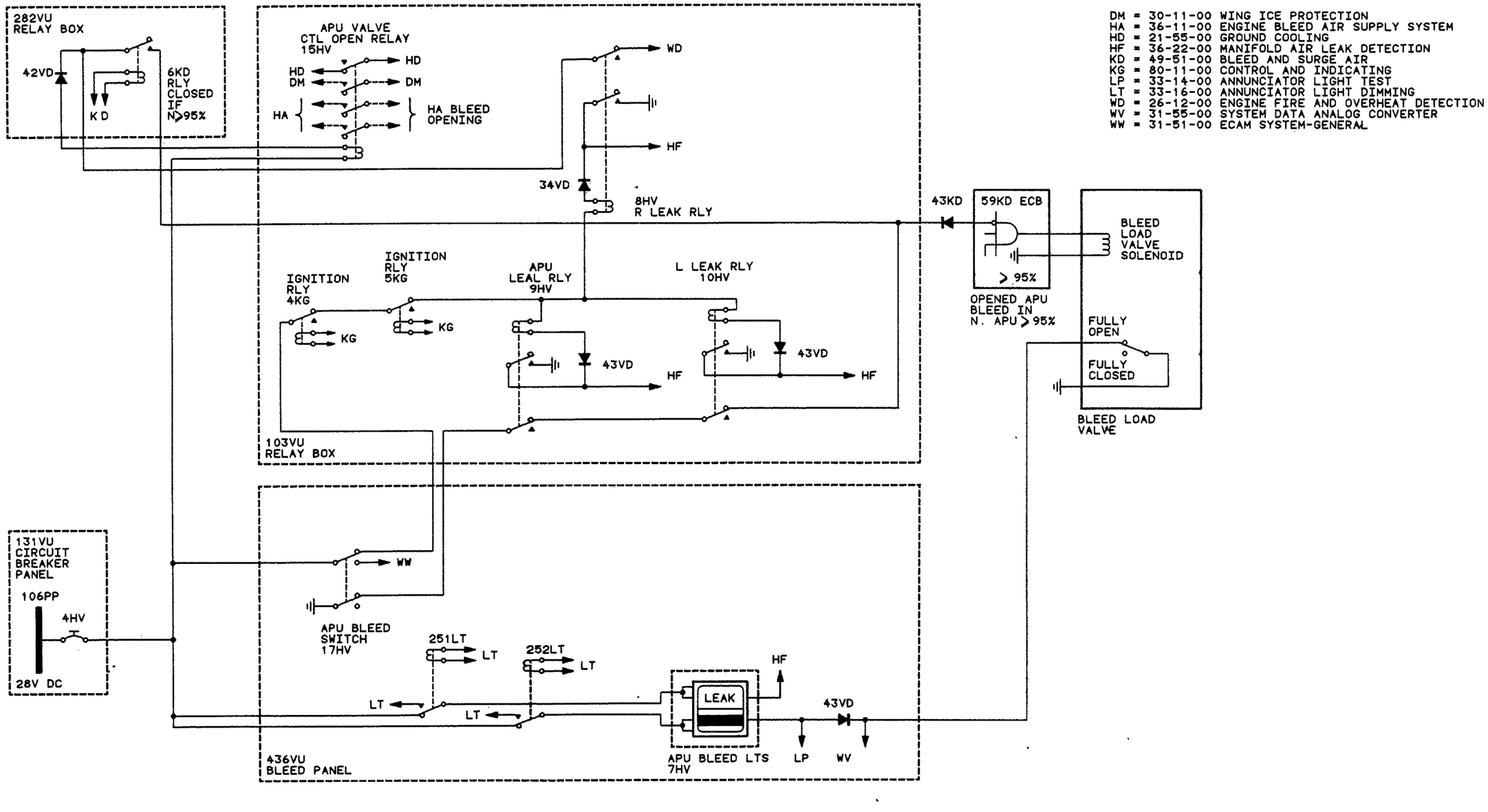


APU Bleed Valve - Schematic Diagram
Figure 006



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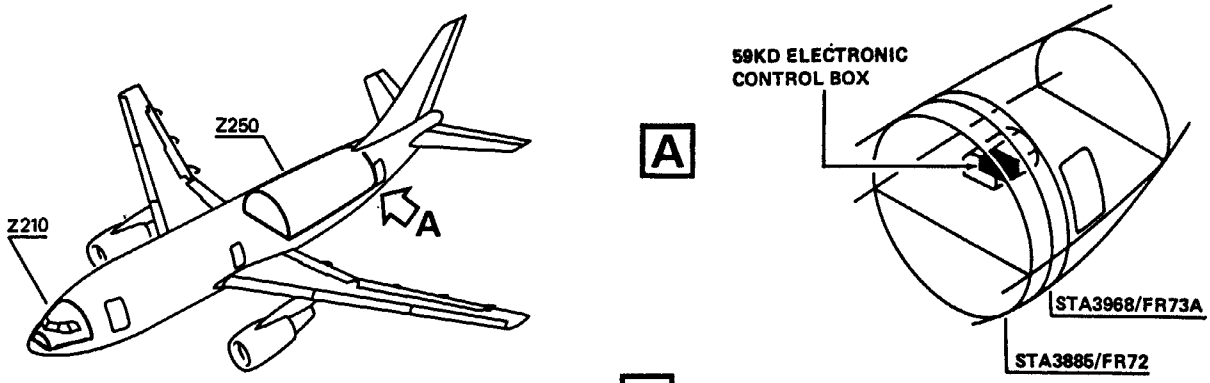
APU Bleed Valve - Schematic Diagram
Figure 007



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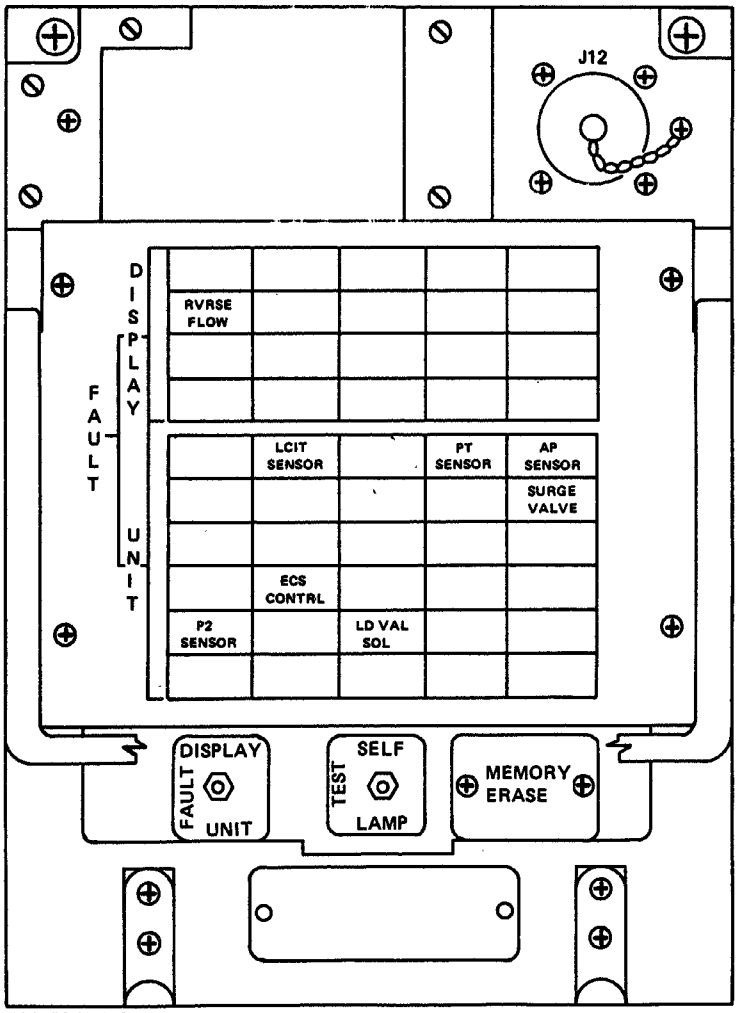


ECB FRONT PANEL
POSSIBLE FAULT ILLUMINATION
FOR BLEED AND SURGE AIR SYSTEM

B M 6 49 51 00 0 AN M 0–24

ECB - Fault Illumination
Figure 008

**Before GARRETT SB 2117402-49-4006

- Two occurrences of LCIT (T2) increasing by more than 60 °F in 1.1 sec. are detected in a 7.5 sec. time period and at least 2.5 sec. apart. The 7,5 seconds period starts to count after detection of the first occurrence.
- Two occurrences of LCIT (T2) greater than 210 °F for 0.1 sec. are detected in a 7.5 sec. time period and at least 2.5 sec. apart. The 7.5 seconds period starts to count after detection of the first occurrence.

**After GARRETT SB 2117402-49-4006

- Two occurrences of LCIT (T2) increasing by more than 120 °F in 1.1 sec. are detected in a 7.5 sec. time period and at least 2.5 sec. apart. The 7.5 seconds period starts to count after detection of the first occurrence.
- Two occurrences of LCIT (T2) greater than 350 °F for 0.1 sec. are detected in a 7.5 sec. time period and at least 2.5 sec. apart. The 7.5 seconds period starts to count after detection of the first occurrence.

WARNING: ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Covers
D.	Blanking Caps and Plugs
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)

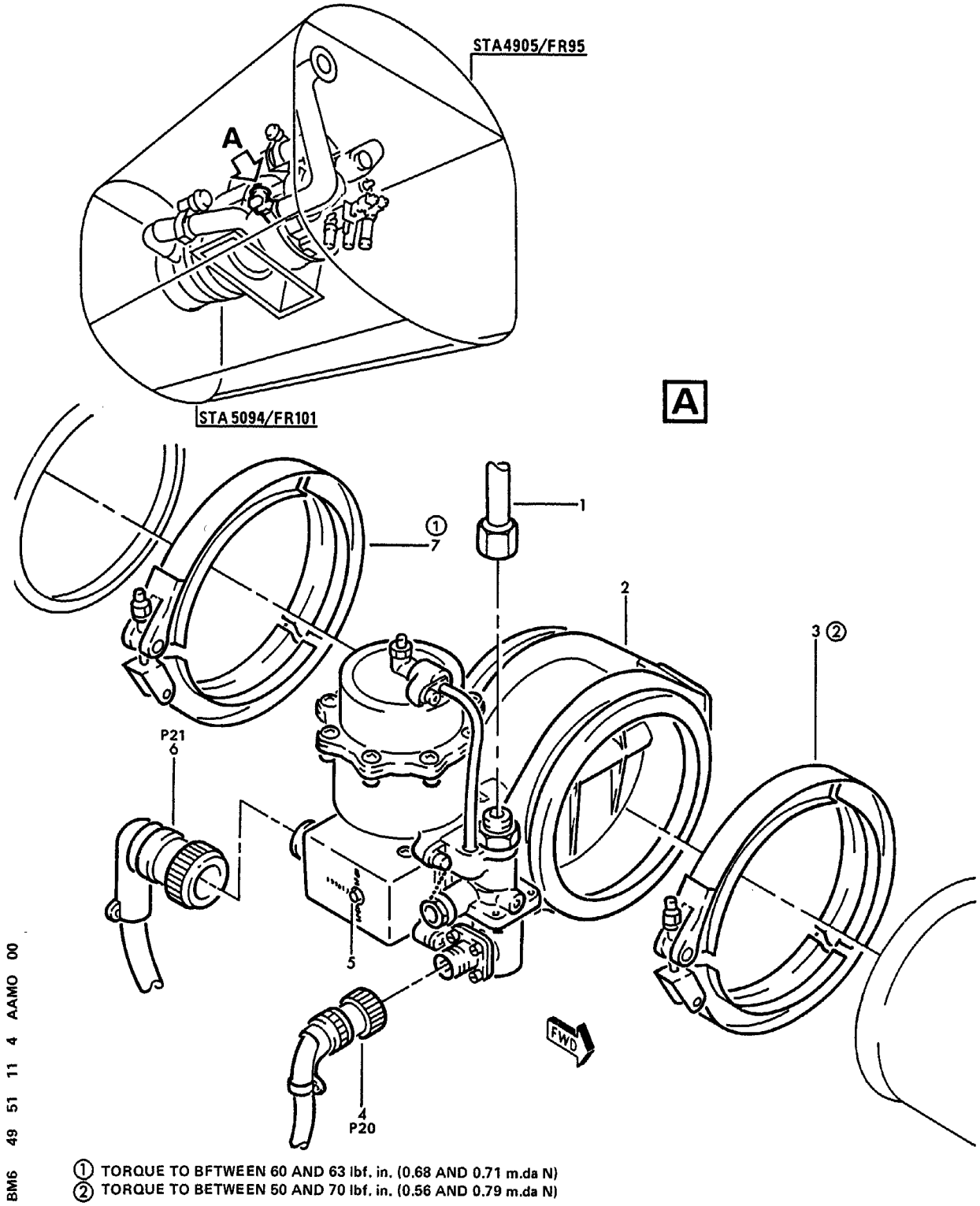
Referenced Procedure

- 49-10-00, P. Block 501	Power Plant

2. Procedure
(Ref. Fig. 401)
A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



① TORQUE TO BFTWEEN 60 AND 63 lbf. in. (0.68 AND 0.71 m.da N)
② TORQUE TO BETWEEN 50 AND 70 lbf. in. (0.56 AND 0.79 m.da N)

Bleed Load Valve
Figure 401

B. Removal

NOTE : Fit blanking caps and plugs or protective covers to disconnected ducts, line and electrical connectors.

(1)Disconnect electrical connectors P21 (6) and P20 (4).
(2)Disconnect pneumatic line (1).
(3)Release clamps (3, 7), disconnect and remove bleed load valve (2).

C. Installation

NOTE : Remove blanking caps and plugs and protective covers from ducts, line and electrical connectors before connection.

(1)Position bleed load valve (2) and install clamps (3, 7). Do not tighten at this stage.
(2)Align bleed load valve and connect pneumatic line (1). Make certain that installation is free of tension.
(3)TORQUE clamp (7) to between 60 and 63 lbf.in. (0.68 and 0.71 m.daN). TORQUE clamp (3) to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(4)Connect electrical connectors P20 (4) and P21 (6).

D. Test

(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

(2)Start and operate APU (Ref. 49-10-00, P. Block 501).
(3)Apply pneumatic load.

ACTION	RESULT
1. On AIR BLEED panel 436VU: - place APU BLEED switch to ON position.	- flowbar in line.
- make certain that X-FEED pushbutton is in AUTO position.	- flowbar in line.
2. On COMPT TEMP panel 437VU: - press PACK VALVE 1 AND PACK VALVE 2 pushbuttons to AUTO position.	- PRESS gage indicates pressure between 10 and 30 psig. - flowbar in line.
3. Check bleed load valve clamp connections (3, 7) for leakage.	- diffused leakage is permissible but a jet-like escape not. For pneumatic line (1), leakage is not permissible.
4. Make certain that the visual position indicator (5) is in OPEN position.	
5. On COMPT TEMP panel 437VU: - release PACK VALVE 1 and PACK VALVE 2 pushbutton to OFF position.	- flowbars not visible. - OFF indicator light comes on.
6. On AIR BLEED panel 436VU: - place APU BLEED switch to OFF/R position.	- flowbar not visible. - X-FEED flowbar cross line.
7. Make certain that visual position indicator (5) is in CLOSED position.	

(4)Shut down APU (Ref. 49-10-00, P. Block 501).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

APU BLEED LOAD VALVE DEACTIVATION/REACTIVATION

1. APU Bleed Load Valve

R REF. MMEL Section 1-36, Item 17 (FAA only)

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MMEL.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Warning Notice
(3)	Circuit Breaker Safety Clips and Tags
(4)	Blanking Caps for Electrical Connectors
(5)	Airtight Blanking Cap and Plug, Metallic, for Pneumatic Pipe and Solenoid Valve Fitting.
(6)	Tie-Strap

Referenced Procedure

- 49-51-11, P. Block 401	APU Bleed Load Valve

B. Procedure

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access door 316AR.

(2)Deactivation

(Ref. Fig. 901)

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MMEL.

(a)Make certain, that visual position indicator (2) indicates that bleed load valve is in CLOSED position.

(b)Remove lockwire and disconnect connector P20 (1) from solenoid valve (3).

(c)Install blanking caps to connector P20 (1) and solenoid valve connector.

(d)Fix connector P20 (1) to harness of connector P21 (5), using tie-strap.

CAUTION : DO NOT DAMAGE PNEUMATIC PIPE AND SOLENOID VALVE FITTING.

(e)Disconnect pneumatic pipe (4) from solenoid valve (3).

(f)Cap pneumatic pipe (4) and fitting of solenoid valve (3) airtight, using metallic blanking cap and plug.

(3)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous item of equipment.

(b)Close access door 316AR and remove access platform.

(c)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

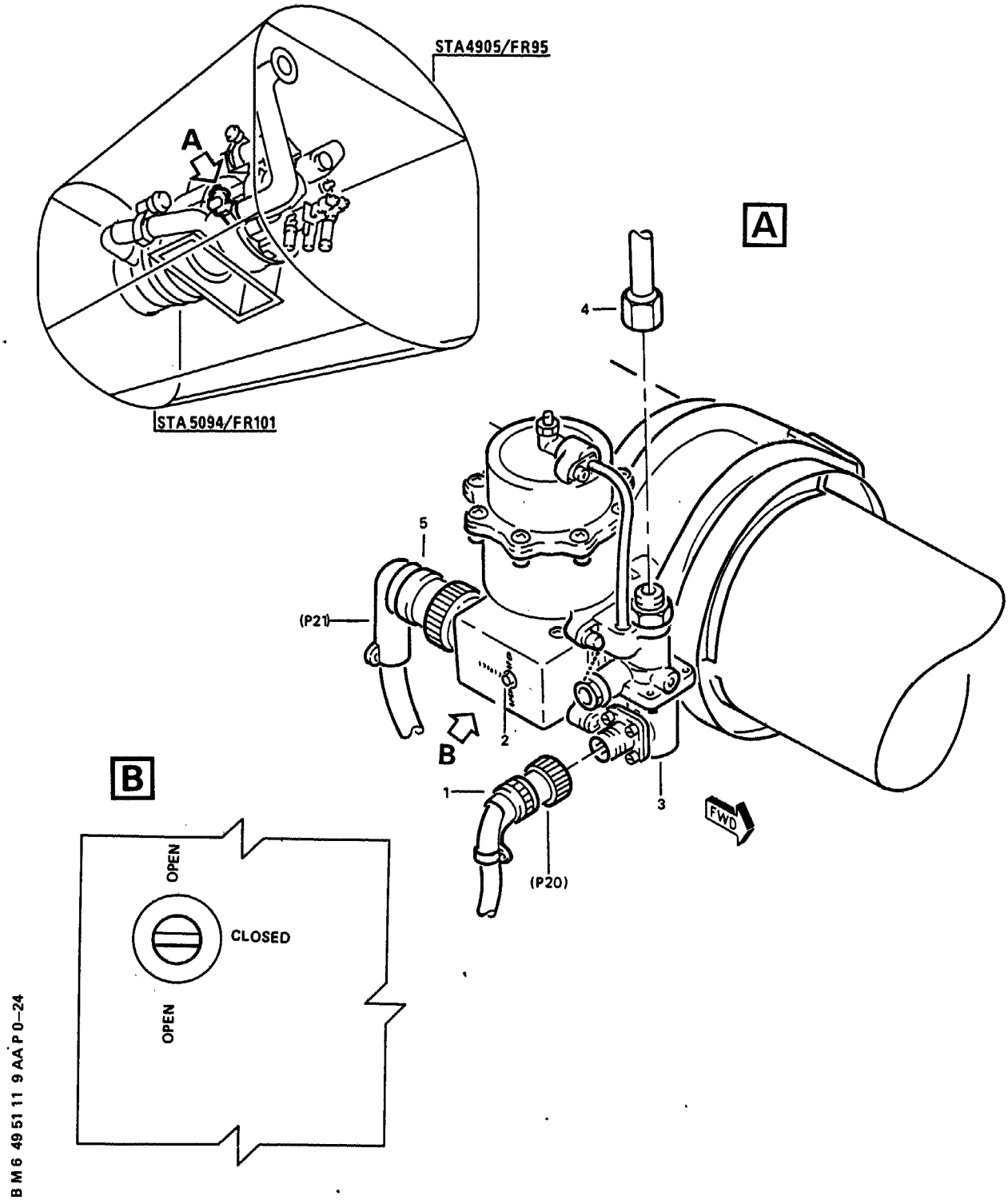
(d)Install a temporary notice in flight compartment to warn flight crew that APU bleed load valve is de-activated in CLOSED position.

(e)Make an entry in the aircraft technical log.

(4)Reactivation

(a)Replace APU Bleed Load Valve (Ref. 49-51-11, P. Block 401).

(b)Remove temporary notice from flight compartment and delete entry in the aircraft technical log.



APU Bleed Load Valve
Figure 901

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
CAUTION : OBSERVE ALL RELEVANT PRECAUTIONS; LIMITATIONS AND PROCEDURES FOR THE FOLLOWING OPERATIONS.
CAUTION : TO AVOID DAMAGE OF MOUNTING SURFACES DO NOT OVERTORQUE CLAMPS.
CAUTION : INSTALL THE FILTER IN THE HOUSING, OPEN END FIRST. LOCATE THE SPRING OVER THE REMOVAL STUD ON THE BOTTOM OF THE FILTER. FAILURE TO INSTALL THE FILTER CORRECTLY WILL RESULT IN AIR BLOCKAGE AND POSSIBLE FAN FAILURE.

1. Surge Control Valve - Removal/Installation

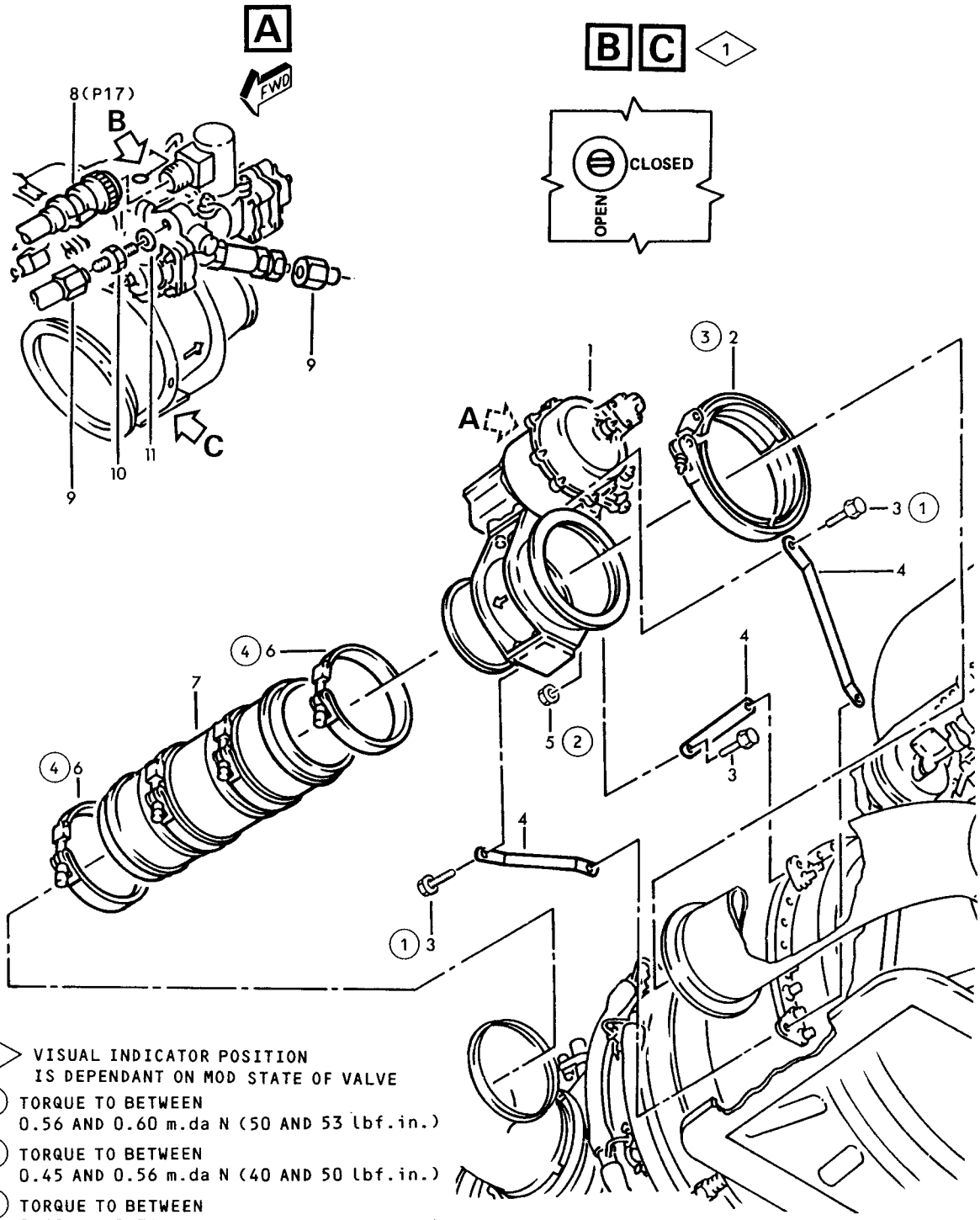
A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Protective Cover
(3)	Blanking Plug
(4)	Torque Wrench, 0-0.85 m.daN. (0-75 lbf.in.)
(5)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(6)	Circuit Breaker Safety Clips and Tags
(7)	O-rings
R (8)Material No. 04-014	Common Greases (Ref. 20-31-00)

(Ref. Fig. 201)
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform.
(c)Open APU access door 315AL and 316AR.



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1 VISUAL INDICATOR POSITION IS DEPENDANT ON MOD STATE OF VALVE

(1) TORQUE TO BETWEEN 0.56 AND 0.60 m.da N (50 AND 53 lbf.in.)

(2) TORQUE TO BETWEEN 0.45 AND 0.56 m.da N (40 AND 50 lbf.in.)

(3) TORQUE TO BETWEEN 0.68 AND 0.71 m.da N (60 AND 63 lbf.in.)

(4) TORQUE TO BETWEEN 0.40 AND 0.45 m.da N (35 AND 40 lbf.in.)

Surge Control Valve
Figure 201

R (2)Removal
R NOTE : Fit blanking caps and plugs or protective covers to disconnected
R electrical connector, duct and pneumatic lines.
R (a)Disconnect electrical connector P17 (8) and pneumatic lines (9).
R (b)Release clamps (6) and remove surge air duct (7).
R (c)Remove nut (5), bolts (3) to release valve (1) from struts (4)
R (d)Release clamp (2) and remove surge control valve (1).

R (3)Preparation for Installation
R (a)Remove fitting (10).
R (b)Remove and discard O-ring (11).
R (c)Install new O-ring (11).
R (d)Install fitting (10).

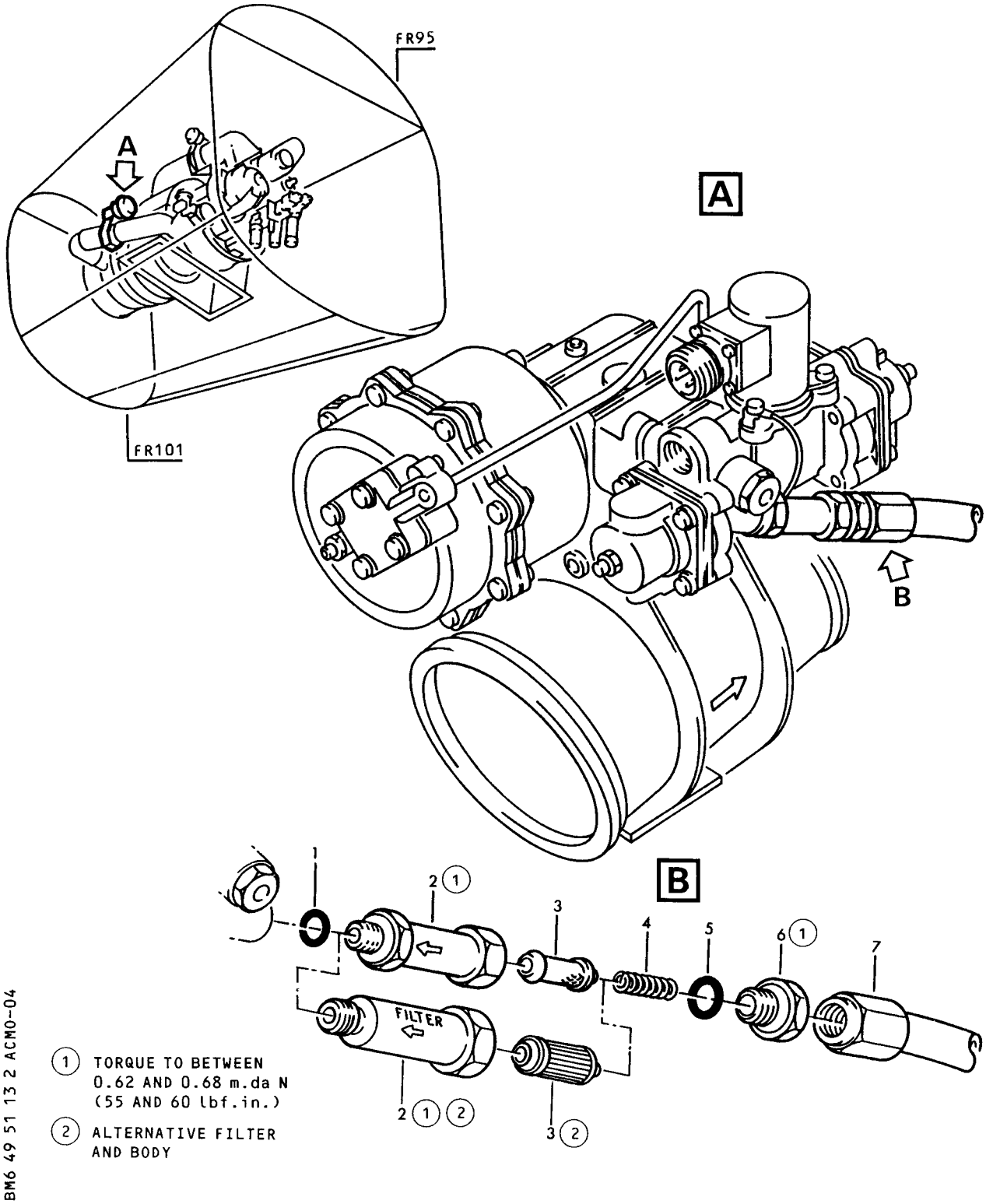
R (4)Installation
R NOTE : Remove blanking caps, plugs and protective covers from ducts,
R pneumatic lines and electrical connector, before connection.
R (a)Position surge control valve (1) and attach with clamp (2). Do not
R tighten at this stage.
R (b)Position surge control valve (1) to align with struts (4), and
R install bolts (3) and nut (5).
R (c)TORQUE bolts (3) to between 0.56 and 0.60 m.daN. (50 and 53 lbf.in.).
R (d)TORQUE nut (5) to between 0.45 and 0.56 m.daN. (40 and 50 lbf.in.).
R CAUTION : TO AVOID DAMAGE OF MOUNTING SURFACES DO NOT OVERTORQUE CLAMPS.
R (e)TORQUE clamp (2) to between 0.68 and 0.71 m.daN (60 and 63 lbf.in.).
R (f)Position surge air duct (7) and secure with clamps (6).
R (g)TORQUE clamps (6) to between 0.40 and 0.45 m.daN. (35 and 40 lbf.in.).
R (h)Connect pneumatic lines (9) and electrical connector P17 (8).
R (3)Test
R (a)Carry out Adjustment/Test. (Ref. Para. 3.).

2. Surge Control Valve Filter - Removal/Installation

A. Procedure
(Ref. Fig. 202)
(1)Removal
(a)Remove lockwire from reducer (6).
(b)Disconnect pneumatic line (7).
(c)Remove reducer (6), spring (4) and filter element (3).
(d)Remove and discard O-ring (5).
R (e)Remove filter body (2) and discard O-ring (1) (Ref. CMM 49-53-67).

(2)Installation
CAUTION : INSTALL THE FILTER IN THE HOUSING, OPEN END FIRST. LOCATE THE SPRING OVER THE REMOVAL STUD ON THE BOTTOM OF THE FILTER. FAILURE TO INSTALL THE FILTER CORRECTLY WILL RESULT IN AIR BLOCKAGE AND POSSIBLE FAN FAILURE.
(a)Lightly lubricate filter body threads with Mat. No. 04-014.
(b)Install new O-ring (1) to filter body (2) and install in valve.
(c)Lightly lubricate reducer threads with Mat. No. 04-014.
(d)Install new O-ring (5) onto reducer (6).
R (e)Insert new or cleaned filter element (3) and spring (4).
(f)Install reducer (6).
(g)TORQUE reducer (6) to between 0.62 and 0.68 m.daN. (55 and 60 lbf.in.)
(h)Reconnect pneumatic line (7) and safety with lockwire.

(3)Test
(a)Carry out Adjustment/Test. (Ref. Para. 3.).



Surge Control Valve Filter
Figure 202

R

3. Surge Control Valve - Adjustment/Test

A. Equipment and Materials

Referenced Procedures

- 23-44-00, P. Block 501	Cabin and Service Interphone
- 30-11-00, P. Block 501	Wing Ice Protection
- 49-00-00, P. Block 501	Airborne Auxiliary Power
- 71-00-00, P. Block 501	Power Plant

B. Procedure

R NOTE : Two people are required to carry out this procedure, one
R in the cockpit and one in the APU compartment.
R (a)Connect service interphone (Ref. 23-44-00, P. Block 1).
R (1)Operational Test
(a)Start and operate APU (Ref. 49-00-00, P. Block 501).

ACTION	RESULT
1. On surge control valve: - Check surge control valve connections for air leakage. - Check surge control valve visual position indicator.	On surge control valve: - Diffused leakage is permissible. - Jet-like escape is not permitted. - Indicator is in OPEN position.

(b)Apply pneumatic load (Ref. 49-00-00, P. Block 501).

CAUTION : OBSERVE ALL RELEVANT PRECAUTIONS, LIMITATIONS AND PROCEDURES FOR THE FOLLOWING OPERATIONS.

ACTION	RESULT
1. On AIR BLEED panel 436VU: - Place APU BLEED switch to ON position. - Make certain that X-FEED push-button is in AUTO position.	On AIR BLEED panel 436VU: - Flowbar of APU BLEED annunciator comes on. - Flowbar of X-FEED annunciator is in line.
2. On COMPT TEMP panel 437VU: - Press PACK VALVE 1 and PACK VALVE 2 pushbuttons. -	On COMPT TEMP panel 437VU: - Flowbars of PACK VALVE 1 and PACK VALVE 2 come on. OFF indicator lights go off.
3. On surge control valve: - Check surge control valve visual position indicator.	On surge control valve: - Indicator is in approx. half open position.
4. On COMPT TEMP panel 437VU: - Release PACK VALVE 1 and PACK VALVE 2 pushbuttons.	On COMPT TEMP panel 437VU: - Flowbars of PACK VALVE 1 and PACK VALVE 2 go off. OFF indicator lights come on.
R 5. Carry out Dry Motoring R procedure of Main Engines (Ref. 71-00-00, P. Block 501).	
6. On surge control valve: Check surge control valve visual position indicator.	On surge control valve: - Indicator is in approx. CLOSED position.
7. On AIR BLEED panel 436VU: - Place APU BLEED switch to OFF/R position. -	On AIR BLEED panel 436VU: - Flowbar of APU BLEED annunciator goes off. Flowbar of X-FEED annunciator is crossline
8. On surge control valve: - Check surge control valve visual position indicator.	On surge control valve: - Indicator is in OPEN position.

(c)Shut down APU (Ref. 49-00-00, P. Block 501).

C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Disconnect service interphone (Ref. 23-44-00, P. Block 1).

(3)Close access doors 315AL and 316AR and remove platform.

R (4)Remove access platform.

TOTAL PRESSURE SENSOR - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

R WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Blanking Caps and Plugs
D.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
F.	Gasket
G.	O-Rings
R H. Material No. 06-009	Common Grease (Ref. 20-31-00)
J. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

2. Procedure

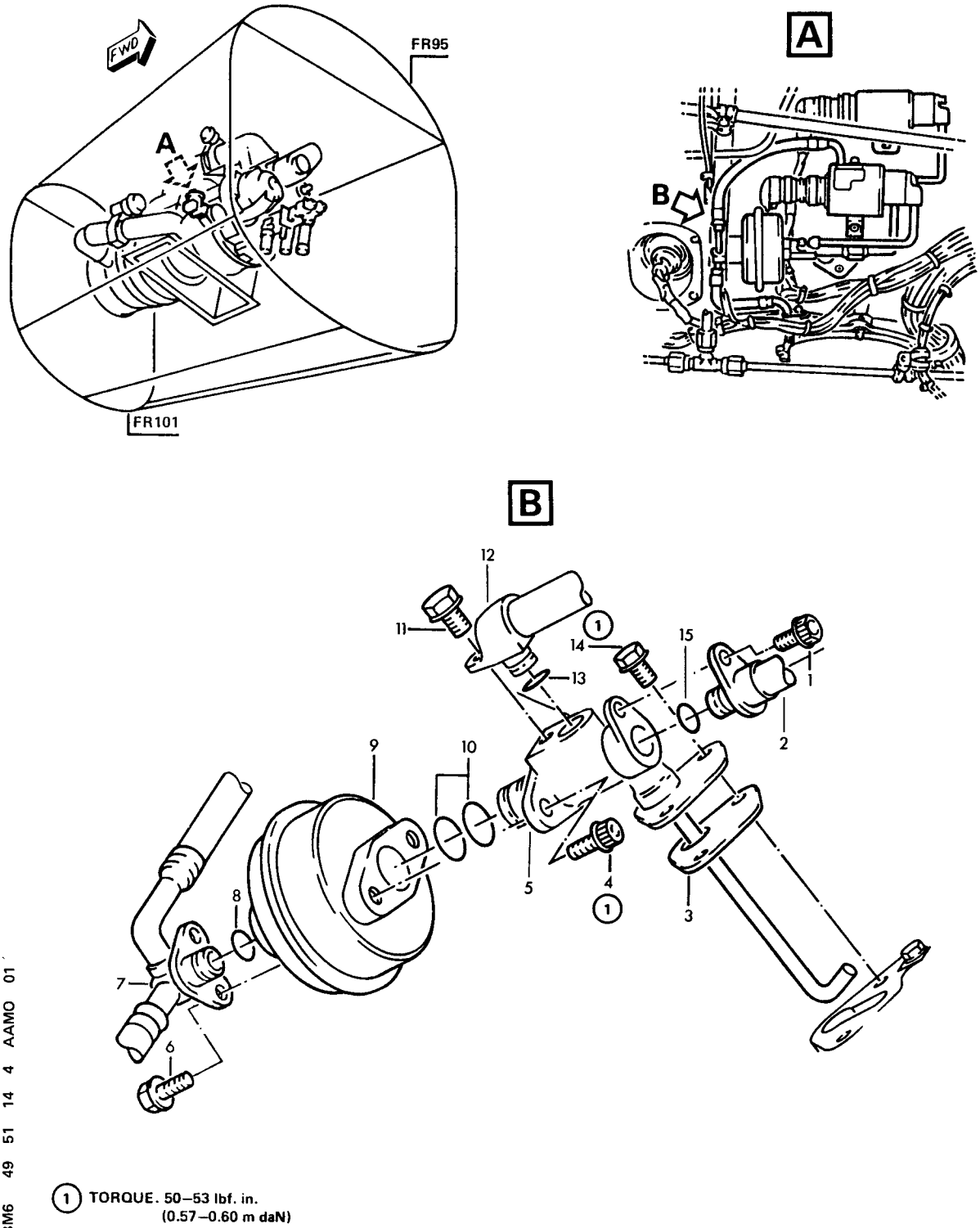
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Total Pressure Sensor
Figure 401

R

B. Removal

NOTE : Install blanking caps and plugs to disconnected lines and open orifices.

R (1)Remove bolts (6) amd disconnect line (7).
R (2)Remove bolt (11) and disconnect line (12).
R (3)Remove bolt (1) and disconnect line (2).
R (4)Remove bolts (4) and variable volume chamber (9).
R (5)Remove and discard O-rings (8), (13), (15) and (10).
R (6)Remove bolts (14) and sensor (5), discard gasket (3).

C. Preparation for Installation

R WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
R (1)Clean sensor (5) and variable volume chamber (9) with cleaning
R agent (Mat. No. 11-002) and dry with compressed air.
R (2)Visually inspect sensor (5) and variable volume chamber (9)
R for damage, replace as necessary.
R (3)Lightly coat O-rings (8), (13), (15) and (10) with common grease
R (Mat. No. 06-009)
R (4)Install O-ring (8) on line connector (7).
R (5)Install O-ring (13) on line connector (12).
R (6)Install O-ring (15) on line connector (2).
R (7)Install O-rings (10) on sensor (5).

D. Installation

NOTE : Remove blanking plugs and caps from lines and orifices before installation.

R (1)Position new gasket (3) and install sensor (5) into APU with bolts (14).
R (2)Position variable volume chamber (9) on sensor (5) and install bolts (4).
R (3)TORQUE bolts (14) and (4) to between 50 and 53 lbf.in.
R (0.56 and 0.6 m.daN).
R (4)Position line (7) and install with bolts (6).
R (5)Position line (12) and install with bolt (11).
R (6)Position line (2) and install with bolt (1).
R (7)Safety bolts (6), (11), (1), (4) and (14) with lockwire.

E. Test
(1)Remove Safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU (Ref. 49-10-00, P. Block 501).
R (3)Check total pressure sensor, variable volume chamber and pneumatic line connections for leakage.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

C. Close-Up
(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Blanking Caps and Plugs
D.	Protective Covers
E.	Gaskets
F.	O-Rings
G.	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.024 in.) dia.

Referenced Procedures

- 49-10-00, P. Block 401	Power Plant
- 49-51-17, P. Block 401	Surge/Bleed Duct

2. Procedure

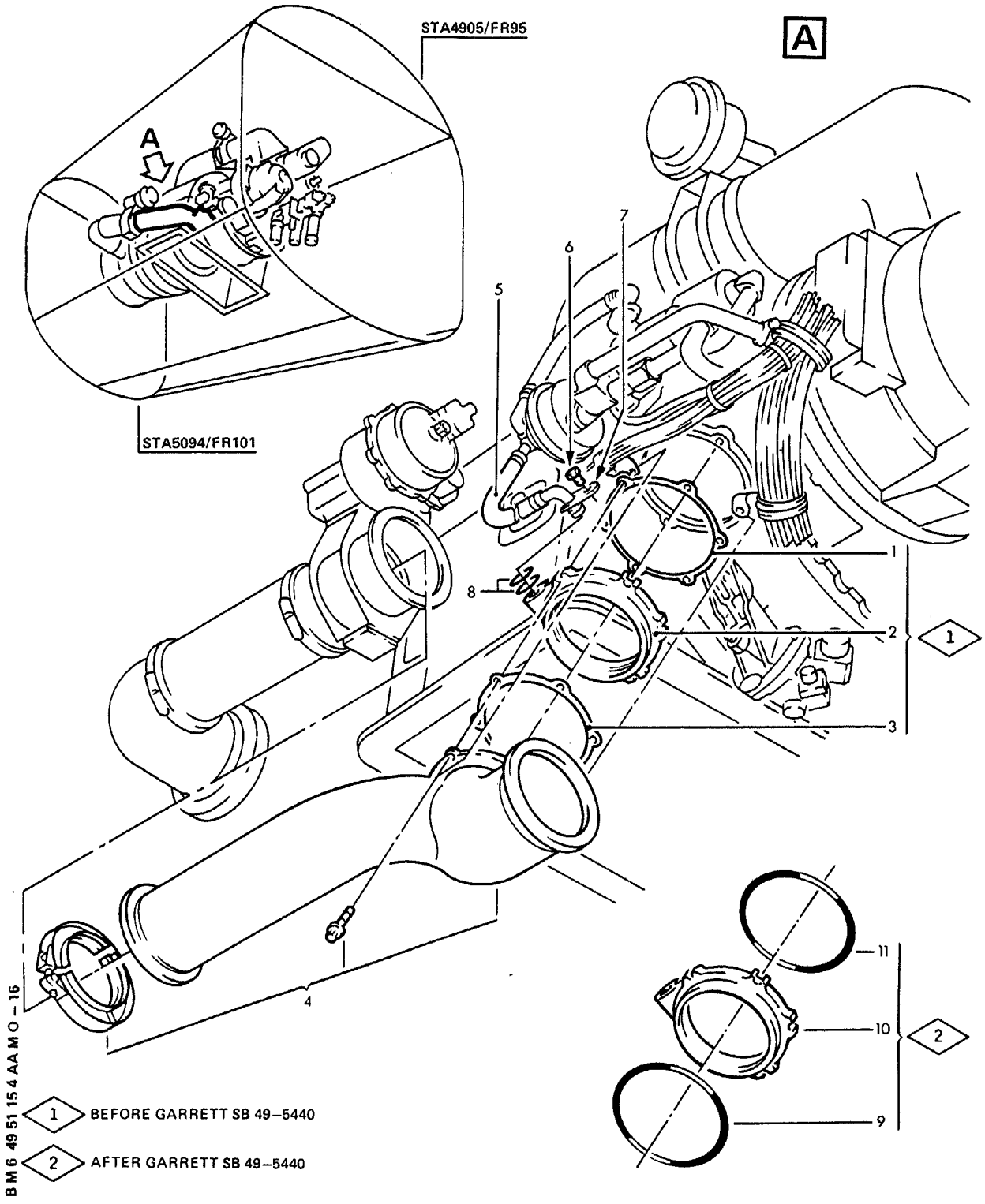
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Static Pressure Sensor
Figure 401

B. Removal

** BEFORE GARRETT SB GTCP331-49-5440

(1)Cut and remove Lockwire and remove bolt (6) and retainer (7).
(2)Disconnect pneumatic line (5) and remove O-Rings (8).
(3)Discard O-Rings (8).
(4)Fit blanking cap and plug.
(5)Remove surge/bleed duct (4) (Ref. 49-51-17, P. Block 401), gaskets (1, 3) and static pressure sensor (2).
(6)Discard gaskets (1, 3).

** AFTER GARRETT SB GTCP331-49-5440

(1)Cut and remove Lockwire and remove bolt (6) and retainer (7).
(2)Disconnect pneumatic line (5) and remove O-Rings (8).
(3)Discard O-Rings (8).
(4)Fit blanking cap and plug.
(5)Remove surge/bleed duct (4) (Ref. 49-51-17, P. Block 401), gaskets (9, 11) and static pressure sensor (10).
(6)Discard O-rings (9, 11).

** A/C ALL

C. Preparation for Installation

(1)Visually inspect static pressure sensor for damage and cleanliness. Replace if necessary.

D. Installation

** BEFORE GARRETT SB GTCP331-49-5440

(1)Position new gasket (1), static pressure sensor (2) and new gasket (3) amd install surge/bleed duct (4) (Ref. 49-51-17, P. Block 401).
(2)Remove blanking cap and plug, install new O-rings (8) and connect pneumatic line (5) to static pressure sensor (2).
(3)Position retainer (7) and install bolt (6). Safety bolt (6) with Lockwire.

** AFTER GARRETT SB GTCP331-49-5440

(1)Position new O-ring (11), static pressure sensor (10) and new O-ring (9) and install surge/bleed duct (4) (Ref. 49-51-17, P. Block 401).
(2)Remove blanking cap and plug, install new O-rings (8) and connect pneumatic line (5) to static Pressure sensor (10).
(3)Position retainer (7) and install bolt (6). Safety bolt (6) with lockwire.

** ON A/C ALL

E. Test
(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU (Ref. 49-10-00, P. Block 501).
(a)If no auto shutdown occurs, shutdown APU (Ref. 49-10-00, P. Block 501).
(b)In case of auto shutdown: On ECB, position FAULT switch to FAULT-DISPLAY position.
Observe that SP. SENSOR display is illuminated.

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR.
(3)Remove access platform.

SURGE AIR DUCT - REMOVAL/INSTALLATION

WARNING: ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Covers
D.	Torque Wrench, 0 - 1.0 m.daN (0 - 88.5 lbf.in.)

Referenced Procedure
- 49-10-00, P. Block 501 Power Plant

2. Procedure

** BEFORE GARRETT SB GTCP331-49-5450

(Ref. Fig. 401)

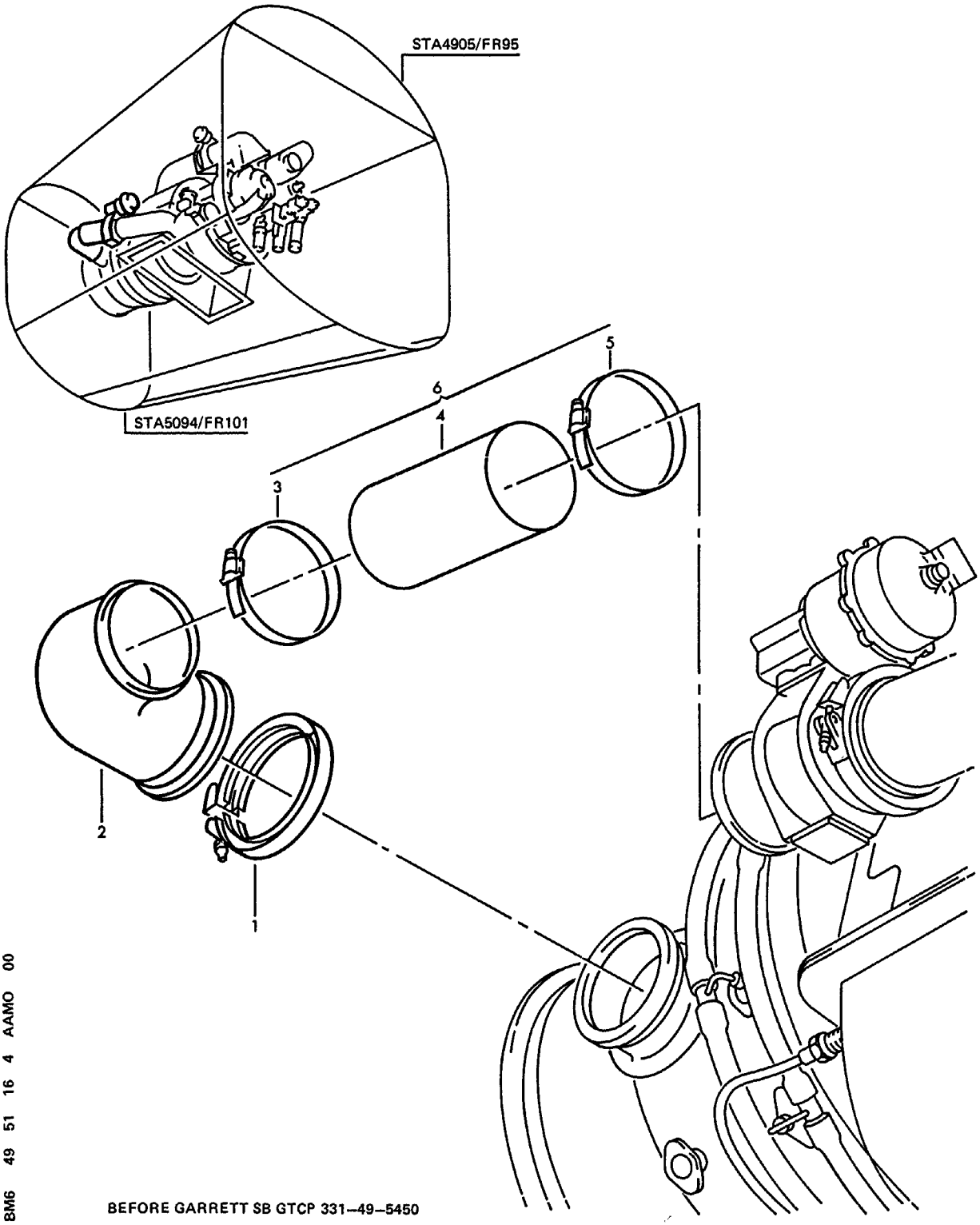
** AFTER GARRETT SB GTCP331-49-5450

(Ref. Fig. 402)

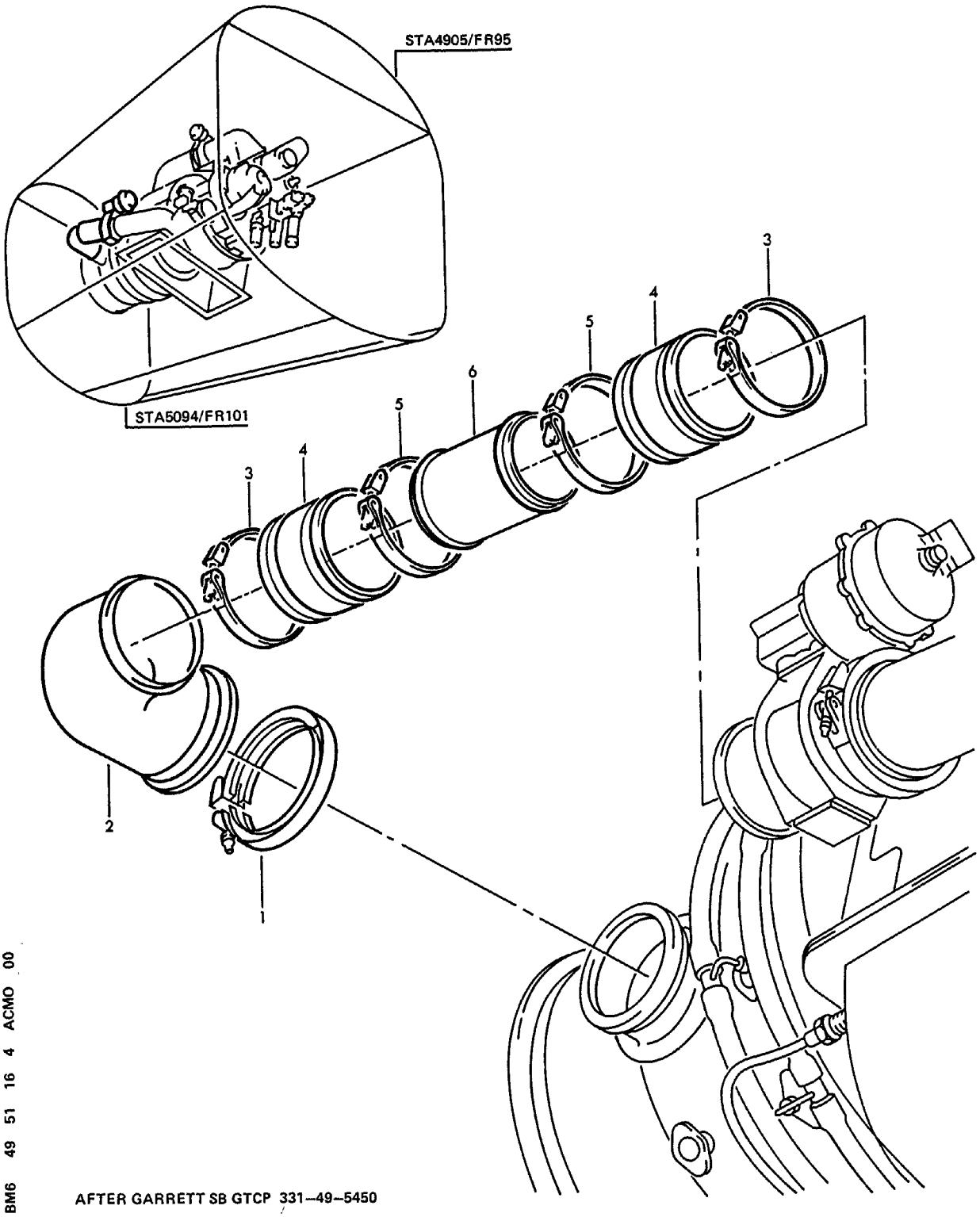
A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Surge Air Duct
Figure 401



Surge Air Duct
Figure 402

B. Removal

** BEFORE CARRETT SB GTCP331-49-5450

(1)Release clamps (1, 5), remove surge air duct (6), with elbow (2) and fit protective covers.
(2)If necessary, release clamp (3) and seperate elbow (2) and flexible duct (4).

** AFTER GARRETT SB GTCP331-49-5450

(1)Release clamps (3) remove surge air duct (4, 6) and fit protective covers.
(2)If necessary, release clamps (5) and separate duct (6) and flexible ducts (4).
(3)If necessary, release clamp (1) and remove elbow (2).

C. Installation

** BEFORE CARRETT SB GTCP331-49-5450

(1)Visually inspect surge air duct (6) for dents, scratches, cracks and abrasion. Replace if necessary.
(2)If separated, position flexible duct (4) to elbow (2) and secure with clamp (3). TORQUE clamp to between 25 and 27 lbf.in. (0.28 and 0.31 m.daN).
(3)Remove protective covers, position surge air duct (6), with elbow (2) and secure with clamps (5, 1).
(4)TORQUE clamp (5) to between 25 and 27 lbf.in. (0.28 and 0.31 m.daN).
(5)TORQUE clamp (1) to between 55 and 58 lbf.in. (0.62 and 0.66 m.daN).

** AFTER GARRETT SB GTCP331-49-5450

(1)If removed, install elbow (2) and secure with clamp (1). TORQUE clamp (1) to between 55 and 58 lbf.in. (0.62 and 0.66 m.daN).
(2)Visually inspect surge air ducts (4, 6) for dents, scratches, cracks and abrasion. Replace if necessary.
(3)If separated, position flexible ducts (4) to duct (6) and secure with clamps (5). TORQUE clamps to between 35 and 40 lbf.in. (0.40 and 0.45 m.daN).
(4)Remove protective covers, position surge air duct (4, 6) and secure with clamps (3). TORQUE clamps to between 35 and 40 lbf.in. (0.40 and 0.45 m.daN).

** ON AC ALL

D. Test
(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU (Ref. 49-10-00, P. Block 501) and check surge air duct for air leakage. Slight diffuse air leakage is permissible, a jet-like escape is not permitted.
(3)Shut down APU (Ref. 49-10-00, P. Block 501)

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

SURGE/BLEED DUCT - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Covers
D.	Torque Wrench, up to 88.5 lbf.in. (1 m.daN)
E.	Gaskets

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-16-14, P. Block 401	Inlet Duct

2. Procedure

(Ref. Fig. 401)

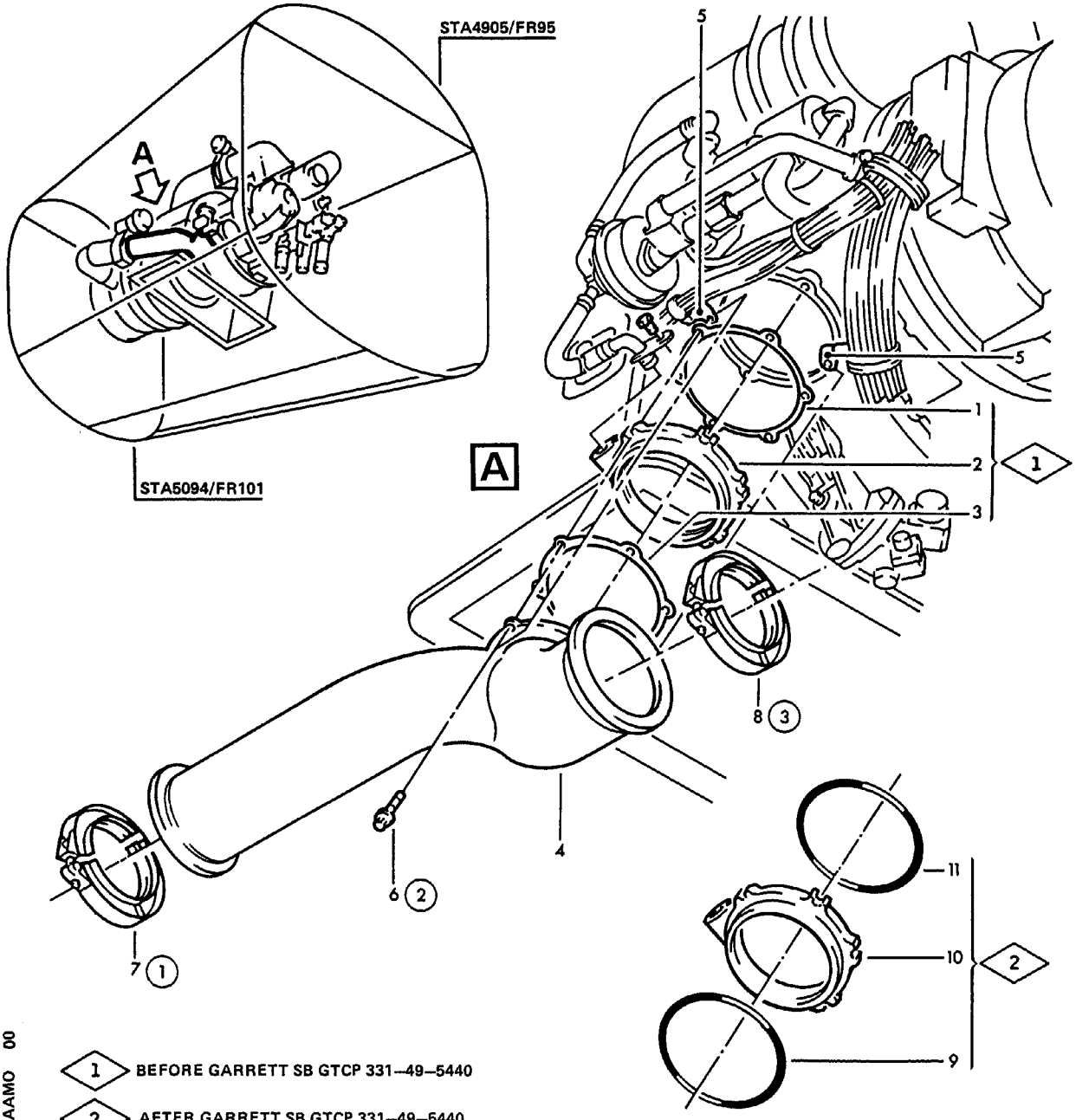
A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

(3)Remove air inlet duct (Ref. 49-16-14, P. Block 401).



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1 BEFORE GARRETT SB GTCP 331–49–5440

2 AFTER GARRETT SB GTCP 331–49–5440

(1) TORQUE TO BETWEEN 60 AND 63 lbf. in. (0.68 AND 0.71 m.da N)

(2) TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.56 AND 0.60 m.da N)

(3) TORQUE TO BETWEEN 60 AND 63 lbf. in. (0.68 AND 0.71 m.da N)

Surge/Bleed Duct
Figure 401

B. Removal
(1)Remove clamp (7) and clamp (8) and support surge/bleed duct (4).
(2)Remove bolts (6) and disengage brackets (5).
(3)Remove surge/bleed duct and gasket (3) or O-ring (9). Discard gasket (3) or O-ring (9).
CAUTION : TAKE CARE NOT TO DAMAGE STATIC PRESSURE SENSOR (2) or (10).
(4)Carefully remove gasket (1) or O-ring (11) and discard, gasket (1) or O-ring (11).
(5)To prevent damage to the static pressure sensor (2) or (10) and its pneumatic line, install two supporting bolts (6) and tighten by hand.
(6)Fit protective covers.

C. Preparation for Installation
(1)Visually inspect surge/bleed duct for scratches, dents or cracks. Replace if necessary.

D. Installation
(1)Remove protective covers and supporting bolts.
(2)Position new gaskets (1, 3) or O-rings (9, 11) and surge/bleed duct (4). Install brackets (5) and bolts (6). Do not tighten.
CAUTION : TO AVOID DAMAGE OF SURFACES, DO NOT OVERTORQUE CLAMPS.
(3)Install clamp (7) and clamp (8). Do not tighten.
(4)TORQUE clamp (7) to between 60 and 63 lbf.in. (0.68 and 0.71 m.daN).
(5)TORQUE bolts (6) to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(6)TORQUE clamp (8) to between 60 and 63 lbf.in. (0.68 and 0.71 m.daN).
NOTE : Make certain that installation is not under tension.
(7)Install air inlet duct (Ref. 49-16-14, P. Block 401).

E. Test
(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
(a)Check static flow sensor connection for air leakage. No leakage is permitted.
(b)Check surge valve and bleed load valve connections. A diffused air leakage is permissible, but a jet-like escape is not permitted.
(3)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

DELTA PRESSURE TRANSDUCER REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
CAUTION : HANDLE PRESSURE TRANSDUCER WITH SPECIAL CARE. MISHANDLING CAN CAUSE MALFUNCTION OR FAILURE.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker, Safety Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Blanking Caps and Plugs
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
F.	O-Rings
G. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

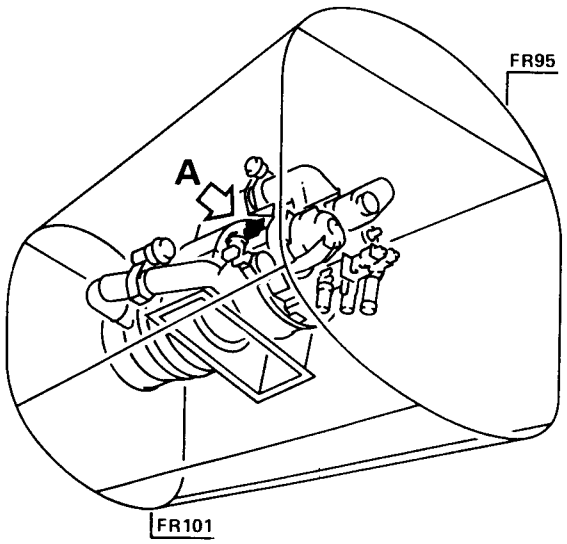
Referenced Procedures

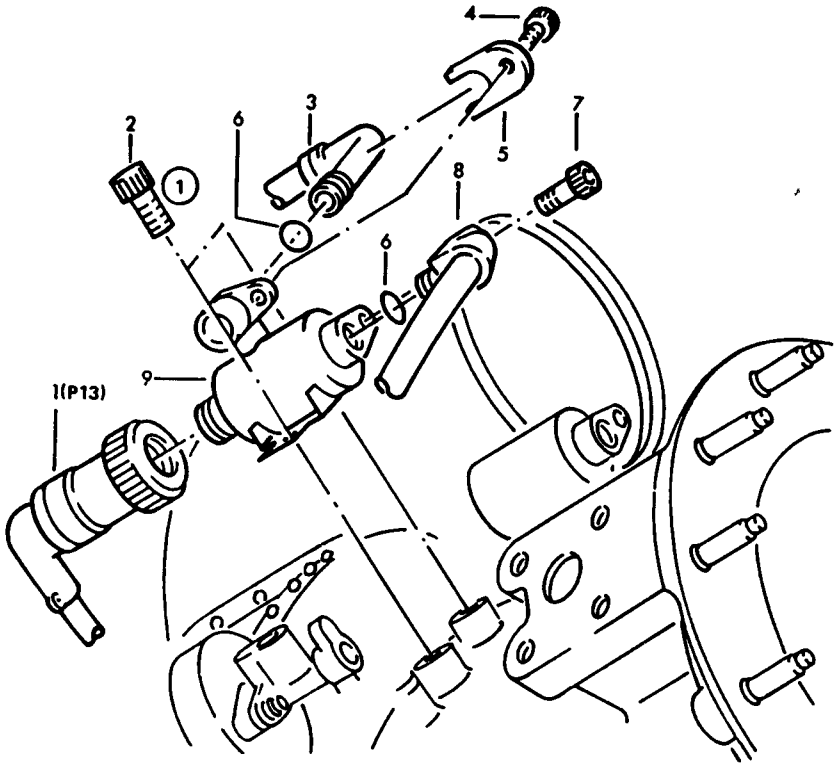
- 49-10-00, P. Block 501	Power Plant
- 49-51-14, P. Block 401	Total Pressure Sensor

2. Procedure
(Ref. Fig. 401)
A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.





NOTE: (1) TORQUE: 50 – 53 lbf. in.
(0.57 – 0.60 m daN)

BM6 49 51 18 4 AAMO 01

Delta Pressure Transducer
Figure 401

R

B. Removal

NOTE : Install blanking caps and plugs to disconnected electrical connector, lines and open orifices.

(1)Disconnect electrical connector P13 (1).
(2)Remove bolt (4) and retainer (5), and disconnect line (3) at delta pressure transducer (9).
(3)Remove bolt (7) and disconnect line (8) at delta pressure transducer. Remove and discard O-rings (6).
(4)If necessary disconnect line (8) from total pressure sensor (Ref. 49-51-14, P. Block 401).
(5)Remove bolts (2) and delta pressure transducer (9).

C. Preparation for Installation

(1)Clean delta pressure transducer using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Visually inspect delta pressure transducer (9) for damage and cracks. Replace if necessary.

D. Installation

NOTE : Remove blanking caps and plugs from lines and orifices before installation.

(1)Position delta pressure transducer (9) and install bolts (2).
(2)TORQUE bolts to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(3)Install O-rings (6), connect line (3) to delta pressure transducer, with retainer (5) and bolt (4).
(4)Install O-ring (6), connect line (8) to delta pressure transducer, with bolt (7).
(5)If removed, connect line (8) to total pressure sensor (Ref. 49-51-14, P. Block 401).
(6)Connect electrical connector P13 (1) and secure with lockwire.

E. Test

(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU (Ref. 49-10-00, P. Block 501).
(3)Check delta pressure transducer and if necessary total pressure sensor and pneumatic line connection for air leakage. Leakage is not permissible.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

TOTAL PRESSURE TRANSDUCER (PT) - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
CAUTION : HANDLE PRESSURE TRANSDUCER WITH SPECIAL CARE. MISHANDLING WILL CAUSE MALFUNCTION OR FAILURE.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Blanking Caps and Plugs
E. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
F.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
G.	O-Rings

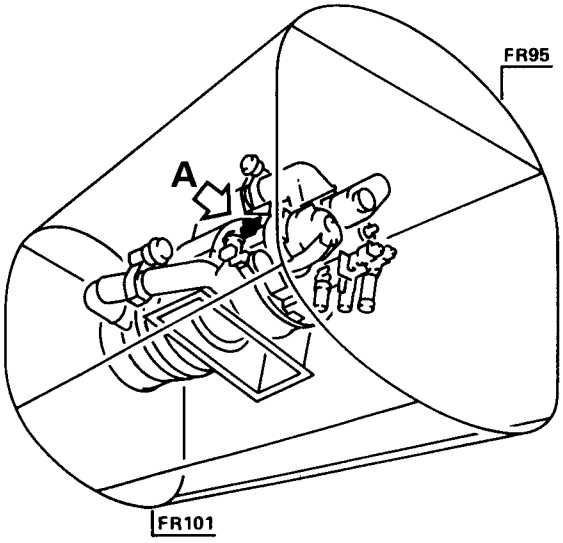
Referenced Procedures

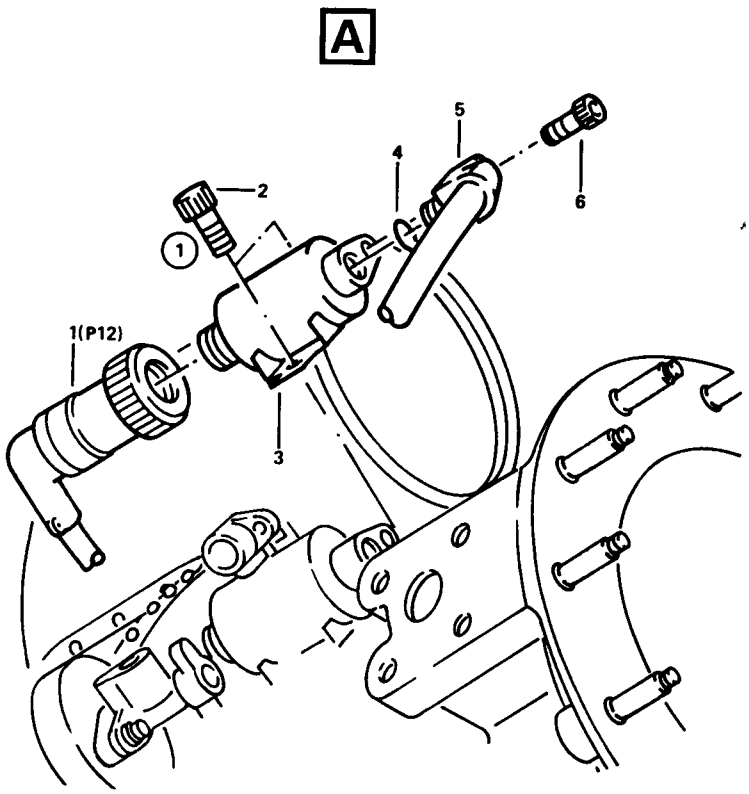
- 49-10-00, P. Block 501	Power Plant
- 49-51-14, P. Block 401	Total Pressure Sensor

2. Procedure
(Ref. Fig. 401)
A. Job Set-Up
(1)Open, safety and tag the following circuit breakers.

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.





NOTE: (1) TORQUE: 50 – 53 lbf. in.
(0.57 – 0.60 m daN)

BM6 49 51 19 4 AAMO 02

R Total Pressure Transducer
Figure 401

B. Removal

NOTE : Install blanking caps and plugs to disconnected electrical connector, lines and open orifices.

(1)Disconnect electrical connector P12 (1).
(2)Cut and remove lockwire, remove bolt (6) and disconnect line (5) at pressure transducer (3). Remove and discard O-ring (4).
(3)If necessary, disconnect line (5) from total pressure sensor (Ref. 49-51-14, P. Block 401).
(4)Remove bolts (2) and pressure transducer (3).

C. Preparation for Installation

(1)Clean pressure transducer (3) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Visually inspect pressure transducer (3) for damage and cracks. Replace if necessary.

D. Installation

NOTE : Remove blanking caps and plugs from electrical connector, lines and orifices before installation.

(1)Position pressure transducer (3) and install bolts (2).
(2)TORQUE bolts to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
(3)Install O-ring (4) and connect line (5) to pressure transducer, install bolt (6) and safety with lockwire.
(4)Connect line (5) to total pressure sensor, if disconnected (Ref. 49-51-14, P. Block 401).
(5)Connect electrical connector P12 (1) and secure with lockwire.

E. Test

(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU (Ref. 49-10-00, P. Block 501)
(3)Check pressure transducer and if necessary total pressure sensor and pneumatic line connection for air leakage. Leakage is not permissible.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

COMPRESSOR INLET PRESSURE SENSOR - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Material

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Blanking Caps and Plugs
E.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
F. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedure
- 49-10-00, P. Block 501 Power Plant

2. Procedure

(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

B. Removal

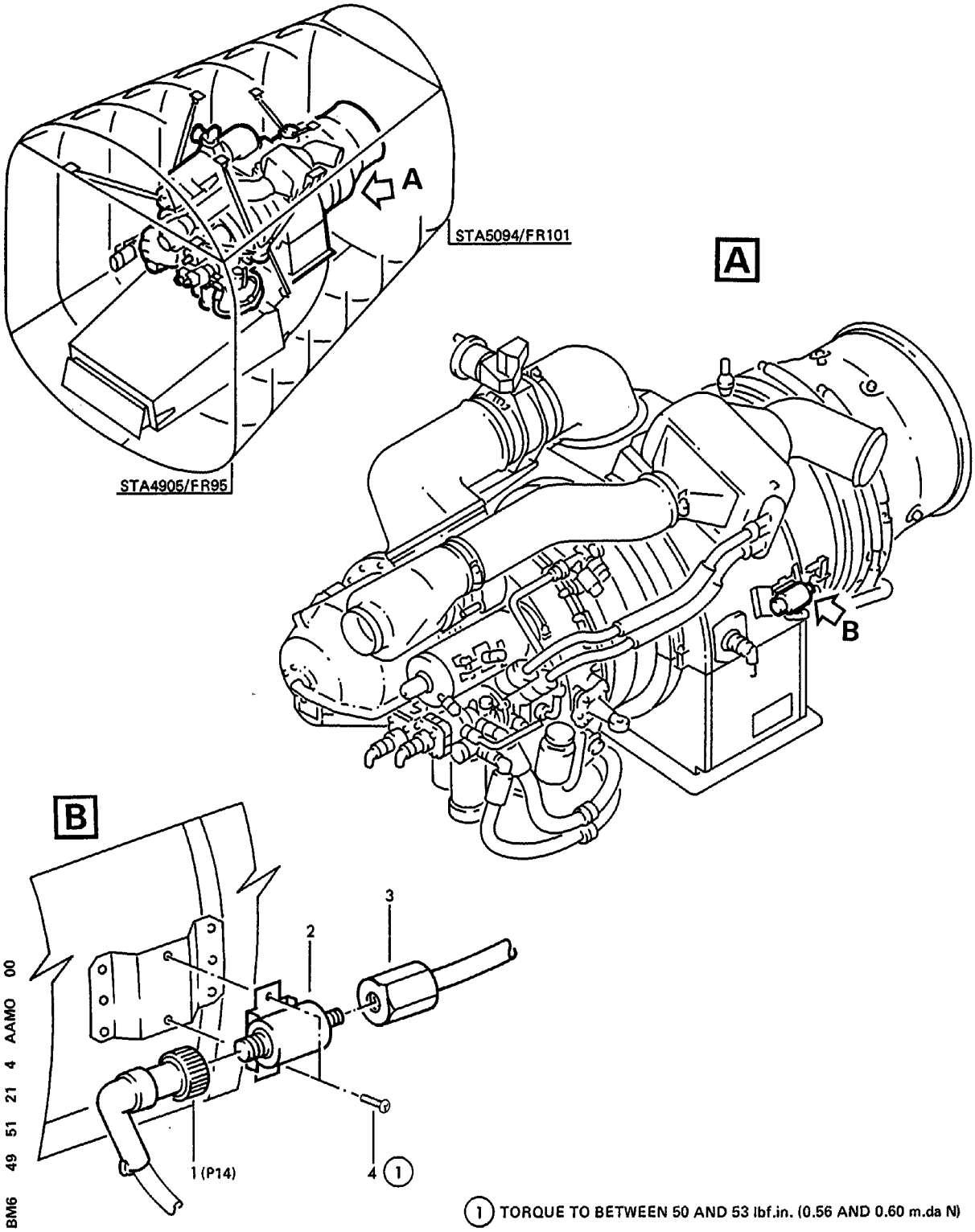
NOTE : Fit blanking caps and plugs to disconnected electrical connector, line and open orifices.

(1)Cut and remove lockwire and disconnect electrical connector (P14) (1).
(2)Disconnect line (3) at pressure sensor.
(3)Remove bolts (4) and pressure sensor (2).

C. Preparation for installation

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(1)Clean pressure sensor using cleaning agent (Mat. No. 11-002) and dry with compressed air.
(2)Visually inspect pressure sensor (2) for damage and cracks. Replace if necessary.



Compressor Inlet Pressure Sensor
Figure 401

D. Installation

NOTE : Remove blanking caps and plugs from electrical connector, lines and orifices before installation.

(1)Position pressure sensor (2) and install bolts (4).
TORQUE bolts to between 0.56 and 0.6 m.daN (50 and 53 lbf.in.).
(2)Connect line (3) to pressure sensor (2).
(3)Connect electrical connector (P14) (1) and secure with lockwire.

E. Test

(1)Start and operate APU (Ref. 49-10-00, P. Block 501) and check compressor inlet pressure sensor line connection for air leakage. Leakage is not permissible.
Shut down APU (Ref. 49-10-00 P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

FLOW SENSING MODULE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES. PROTECT EYES AND SKIN. USE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.
CAUTION : REMOVE AND INSTALL MODULE WITH GREAT CARE, DAMAGE TO PROBES WILL OCCUR IF MODULE IS LEVERED OR TWISTED.

NOTE : The Flow Sensing Module is calibrated as a complete unit, do not replace individual components of the module on the A/C.

1. Equipment and Material

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Gasket
E.	Blanking Caps and Plugs
F.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
G. Material No. 11-002	Cleaning Agent (Ref. 20-31-00)

Referenced Procedure
- 49-10-00, P. Block 501 Power Plant

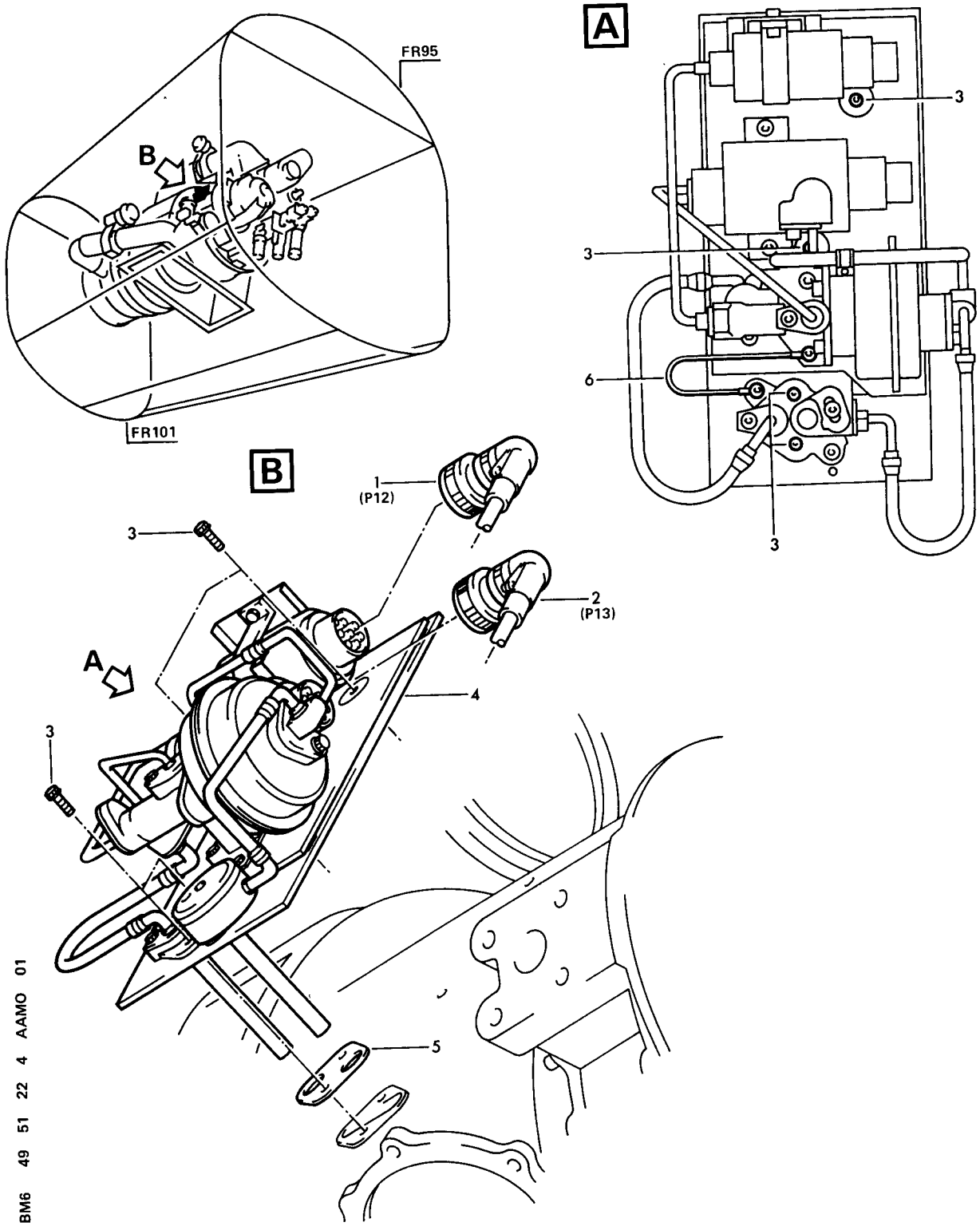
2. Procedure
(Ref. Fig. 401)
R (Ref. Fig. 402)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

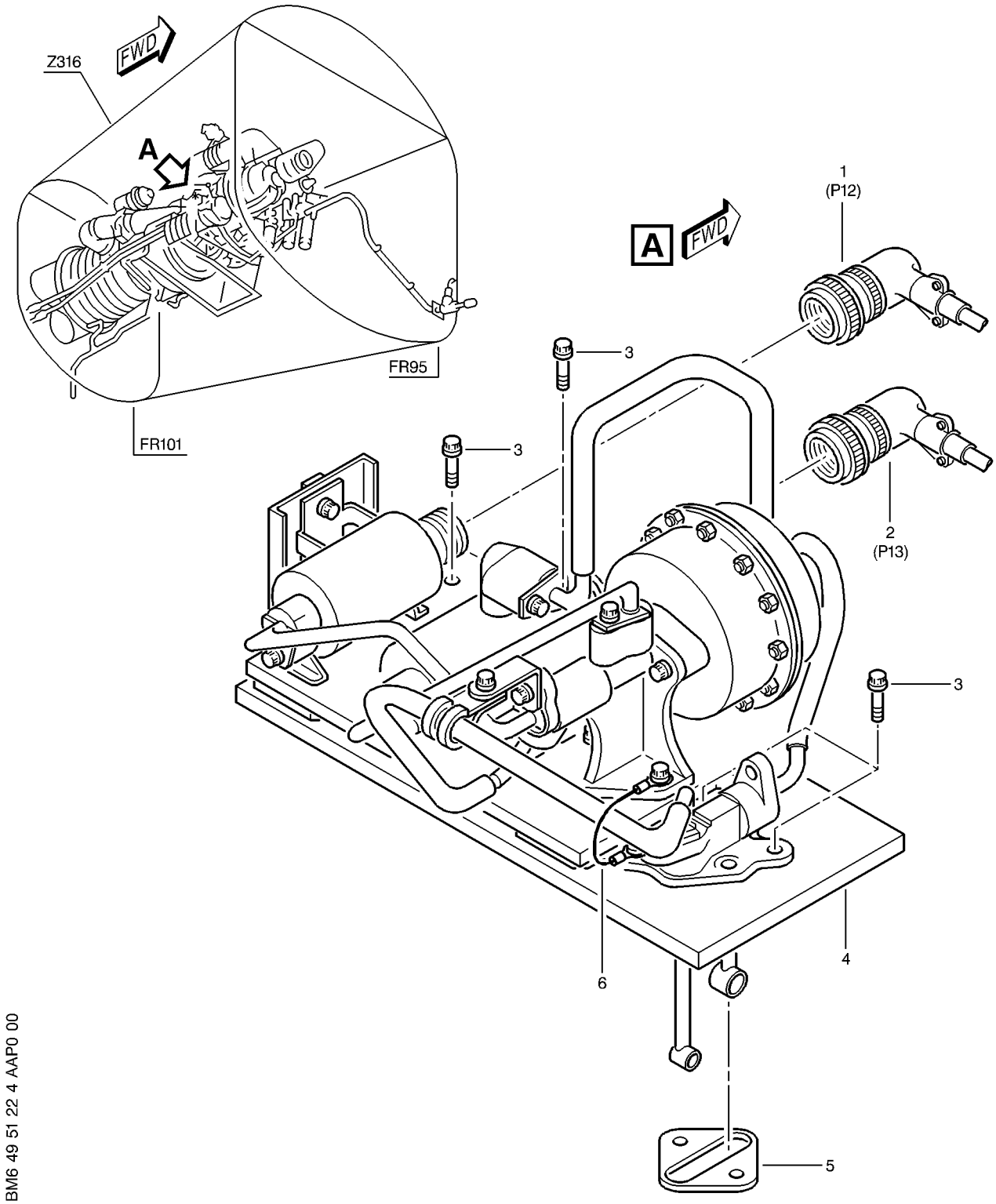
(2)Position access platform and open access doors 315AL and 316AR.

B. Removal
NOTE : Fit blanking caps to disconnected electrical connectors and plug in open orifice.
(1)Cut and remove lockwire and disconnect electrical connectors P12 (1)



Flow Sensing Module - Before Vendor SB 49-6921
Figure 401

R



BM6 49 51 22 4 AAP0 00

Flow Sensing Module - After Vendor SB 49-6921
Figure 402

R

and P13 (2).

CAUTION : WHEN REMOVING MODULE, DO NOT TWIST OR USE BASE PLATE AS A LEVER. THE PROBES WILL BE BENT OR DAMAGED IF THE MODULE IS NOT LIFTED GENTLY, STRAIGHT OUT OF THE APU.

(2)Remove bolts (3) and lift module (4) directly out and away from APU.

(3)Remove and discard gasket (5).

C. Preparation for installation

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(1)Clean module (4) using cleaning agent (Mat. No. 11-002) and dry with compressed air.

(2)Visually inspect module (4) for damage. Replace if necessary.

D. Installation

NOTE : Remove blanking caps from electrical connectors and plug from orifice before installation.

(1)Fit new gasket (5) in position on APU.

CAUTION : WHEN INSTALLING MODULE, DO NOT TWIST THE UNIT OR THE PROBES WILL BE BENT OR DAMAGED. FIT THE MODULE GENTLY, STRAIGHT INTO THE APU.

(2)Put module (4) gently in position on the APU and attach with bolts (3).

(3)TORQUE bolts (3) to between 0.68 and 0.71 m.daN. (60 and 63 lbf. in.).

(4)Connect electrical connectors P13 (2) and P12 (1) and safety with lockwire.

E. Test

(1)Start and operate APU (Ref. 49-10-00, P. Block 501) and check module (4) and gasket (5) for leakage. Leakage is not permissible.

(2)Shut down APU (Ref. 49-10-00 P. Block 501).

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close access doors 315AL and 316AR and remove access platform.

ACCESSORY COOLING - DESCRIPTION AND OPERATION

1. General

The APU cooling air and ventilation system provides air for cooling the APU oil system and ventilation of the APU compartment. The cooling air system consists of a fan shut-off valve, gearbox-driven cooling fan, oil cooler and associated ducting.

2. Component Location

(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	SHUT-OFF VALVE - COOLING FAN		316	316AR	49-52-17
	COOLING FAN		316	316AR	49-52-11
	OUTLET DUCT - OIL COOLER		315	315AL	49-52-14

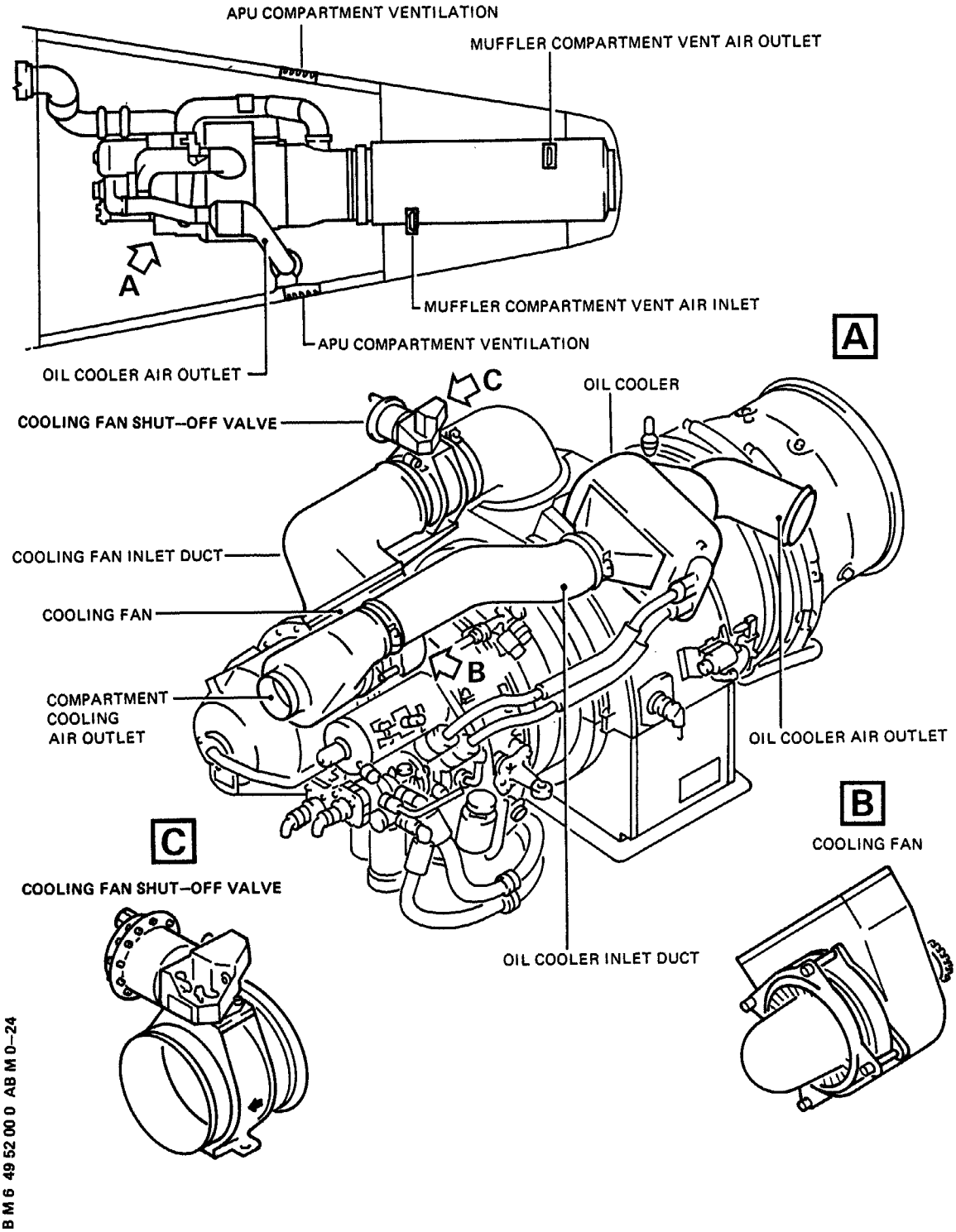
3. Description

(Ref. Fig. 002)

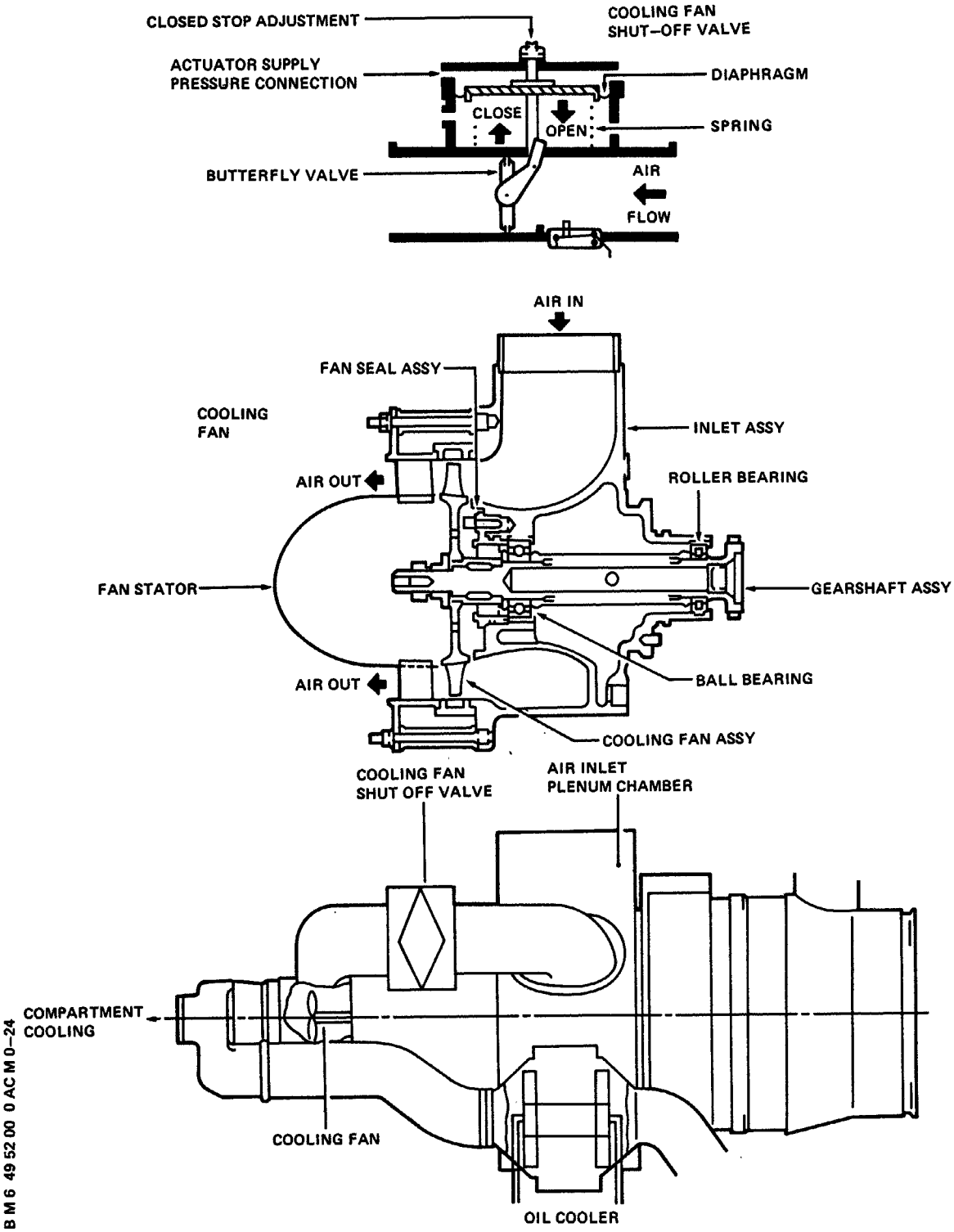
A. The gearbox driven cooling fan provides cooling air to the oil cooler and APU compartment. It consists of an inlet housing with ventilator rotor and stator unit, and a hub container. The fan assembly is mounted on the gearbox with a clamp.

B. The cooling fan shut-off valve isolates air from the plenum chamber to the cooling fan inlet duct during APU start and shutdown. It is installed in front of the cooling fan inlet duct.
The valve is a spring loaded closed, pneumatic actuated butterfly valve. The valve opens automatically on APU start, when regulated air from the surge control valve (SCV) increases above 7.5 psig. During APU shutdown, when the regulated air pressure from SCV decreases below 7.5 psig the valve closes.
An electrical position switch sends the open and closed signal to the ECB.

C. Air from the cooling fan cools APU oil in the oil cooler and is vented outboard thru the oil cooler air outlet duct. It also ventilates the APU compartment and is vented overboard thru air outlets in the APU compartment access doors. Louvres located in the tail cone structure and air outlets located in the APU compartment access doors provides additional ventilation for the APU compartment.



APU Cooling - Ventilation
Figure 001



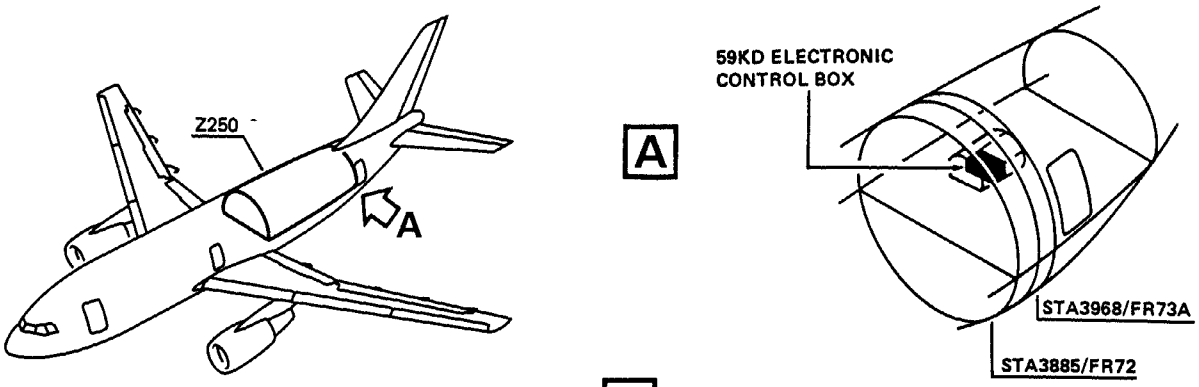
APU Cooling Air Supply
Figure 002

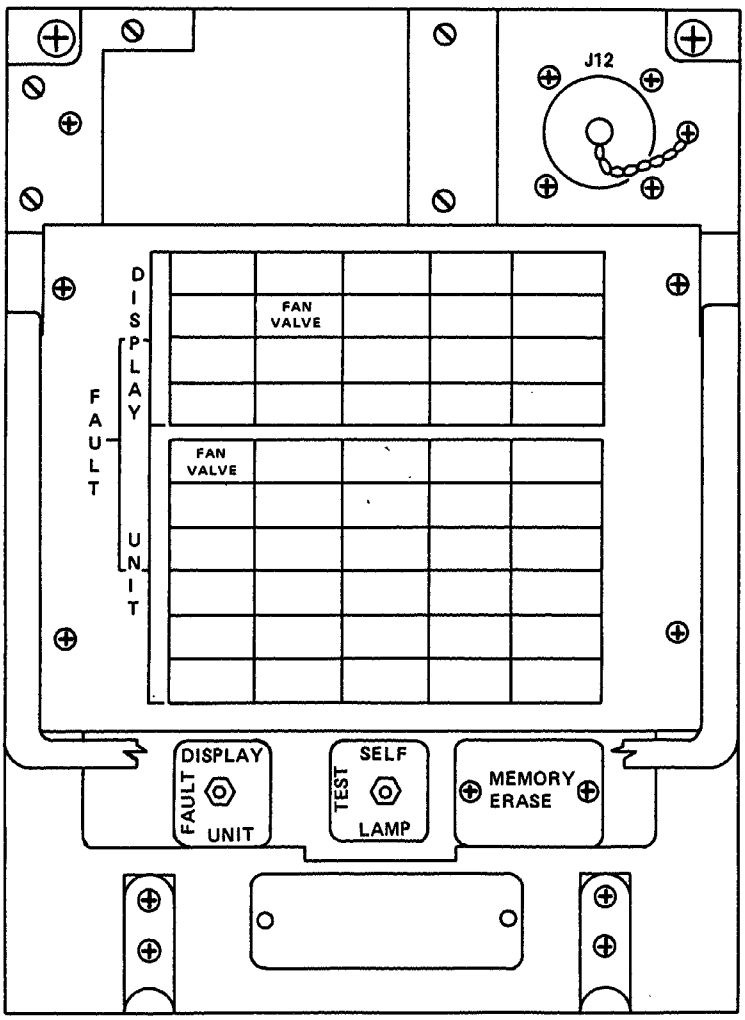
4. Operation
(Ref. Fig. 003)

A. When APU start is initiated:
- When regulated air pressure from the surge control valve (SCV) is more than 7.5 psig, the cooling fan shut-off valve opens.
- Cooling air enters the duct from the APU inlet plenum and passes thru the shut-off valve to the cooling fan. The cooling fan provides air to the APU compartment and to the oil cooler.

B. When APU shut-off is initiated:
- When regulated air pressure from the SCV falls below 7.5 psig, the cooling fan shut-off valve closes.

C. If the cooling fan shut-off valve does not open, during APU start cycle:
- The APU shuts down at 95% rpm.
- A fault signal is stored in ECB memory (Ref. 49-73-00).





ECB FRONT PANEL POSSIBLE FAULT ILLUMINATION FOR ACCESSORY COOLING

B M 6 49 52 00 0 AE M 0-24

ECB - Fault Illumination
Figure 003

COOLING FAN - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Plugs and Caps
C.	Circuit Breaker Safety Clips and Tags
D.	O-Rings
E.	Torque Wrench, 0-1 m.daN (0-88.5 lbf.in.)
F. Material No. 03-002	Oils (Ref. 20-31-00)
or	
G. Material No. 03-003	Oils (Ref. 20-31-00)
Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

2. Procedure
(Ref. Fig. 401, 402)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52

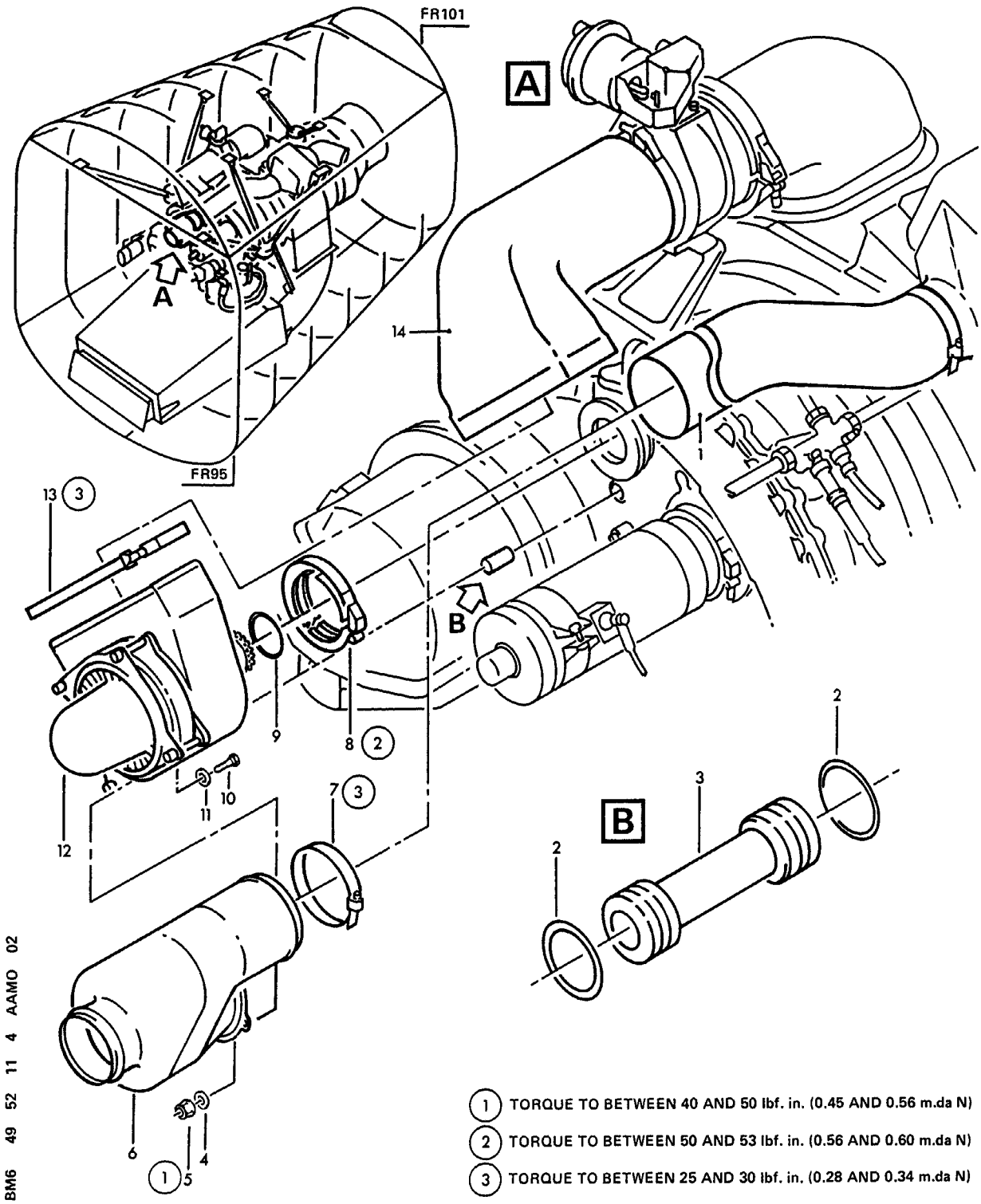
(2)Position access platform and open access doors 315AL and 316AR.

R ** COOLING FAN BEFORE VSB 49-5867

B. Removal (Ref. Fig. 401).
(1)Release clamps (7,13) and disconnect ducts (1,14).
(2)Release clamp (8) and remove fan assembly (12).
(3)Remove oil transfer tube (3).
(4)Remove and discard O-rings (2,9).
(5)Remove nuts (5), bolts (10) and washers (4,11) and remove exhaust duct from fan assembly.
(6)Fit blanking plugs or caps to all open ports.

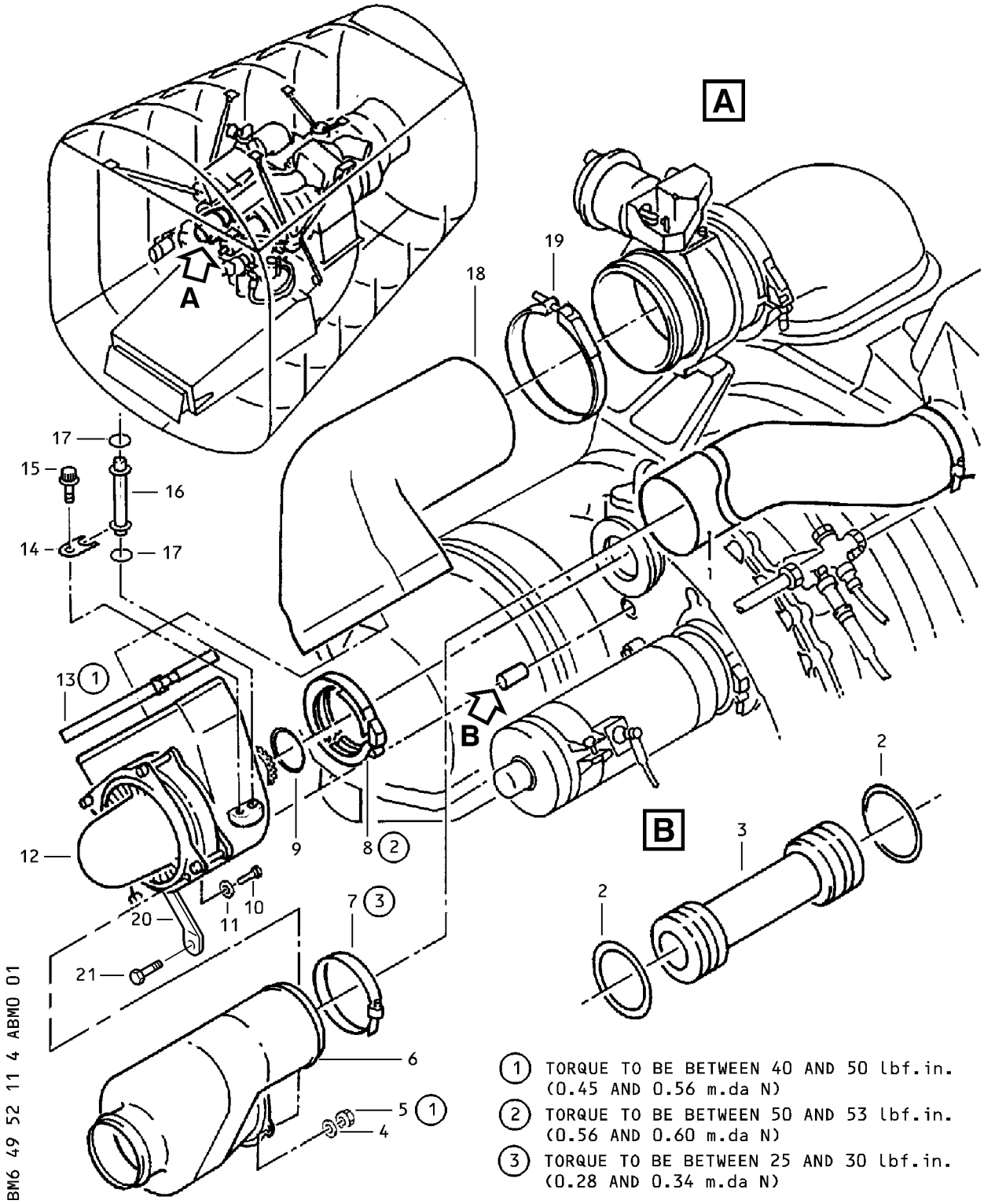
R ** COOLING FAN AFTER VSB 49-5867

B. Removal (Ref. Fig. 402).
(1)Remove bolt (20) to release support strut (21).



COOLING FAN BEFORE VSB 49-5867

R Figure 401



COOLING FAN AFTER VSB 49-5867

R Figure 402

(2)Release clamps (13,19) and remove duct (18).
(3)Remove nuts (5) bolts (10) and washers (4,11).
(4)Release clamp (7) and remove exhaust duct (6).
(5)Remove bolt (15) retainer (14) and disconnect tube (16) from fan assembly (12).
(6)Release clamp (8) and remove fan assembly (12).
(7)Remove oil transfer tube (3).
(8)Remove and discard O-rings (2,9,17).
(9)Fit blanking plugs or caps to all open ports.

R ** ON A/C ALL

C. Preparation for Installation.
(1)Inspect fan inlet and exhaust ducts for damage.
(2)Inspect cooling fan and gearbox mounting flange for damage.
(3)Inspect magnetic plug for contamination if cooling fan was replaced for a mechanical fault (Ref. 49-91-13, P. Block 201).

R ** COOLING FAN BEFORE VSB 49-5867

D. Installation (Ref. Fig. 401).
(1)Remove all blanking plugs and caps.
(2)Put fan exhaust duct in position and attach with bolts (10), washers (4,11) and nuts (5).
(3)TORQUE nuts (5) to between 0.45 and 0.56 m.daN (40 and 50 lbf.in.).
(4)Lubricate new O-rings (2,9) with oil (Mat.No.03-002 or 03-003) and install in correct positions.
(5)Install oil transfer tube (3) into fan assembly (12).
(6)Put clamp (8) in position and install fan assembly.
(7)TORQUE clamp (8) to between 0.56 and 0.60 m.daN (50 and 53 lbf.in.).
(8)Connect ducts (1,14) and secure with clamps (7,13).
(9)TORQUE clamps (7,13) to between 0.28 and 0.34 m.daN (25 and 30 lbf.in.).

R ** COOLING FAN AFTER VSB 49-5867

D. Installation (Ref. Fig. 402).
(1)Remove all blanking plugs and caps.
(2)Lubricate new O-rings (2,9,17) with oil (Mat.No. 03-002 or 03-003) and install in correct positions.
(3)Install oil transfer tube (3) into fan assembly (12).
(4)Put clamp (8) in position and install fan assembly (12), do not fully tighten clamp at this time.
(5)Attach support strut (20) with bolt (21).
(6)Install tube (16) in fan assembly (12).
(7)Make certain fan assembly is in correct position and TORQUE clamp (8) to between 0.56 and 0.60 m.daN. (50 and 53 lbf.in.).
(8)TORQUE bolt (21) to 1.468 m.daN (130 lbf. in.).
(9)Install retainer (14) with bolt (15).
(10)Position exhaust duct (6) and install bolts (10) washers (4,11) and nuts (5).
(11)TORQUE nuts (5) to between 0.45 and 0.56 m.daN. (40 and 50 lbf.in.).
(12)Install clamp (7) and TORQUE to between 0.28 and 0.34 m.daN. (25 and 30 lbf.in.).
(13)Position duct (18) and attach with clamps (13,19).
(14)TORQUE clamp (13) to between 0.28 and 0.34 m.daN. (25 and 30 lbf.in.).

**ON A/C ALL

E. Test
(1)Remove safety clips and tags and close following circuit breakers: 50KA, 1KD, 58KD, 10QC, 11QC and 71KD.
(2)Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
(3)Inspect cooling fan connections for oil and air leakage.
NOTE : Oil leaks are not permissible. Slightly diffused air leakage is permitted but a jet-like escape is not permissible.
(4)Shut down the APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscel-

laneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

OIL COOLER OUTLET DUCT - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Cover

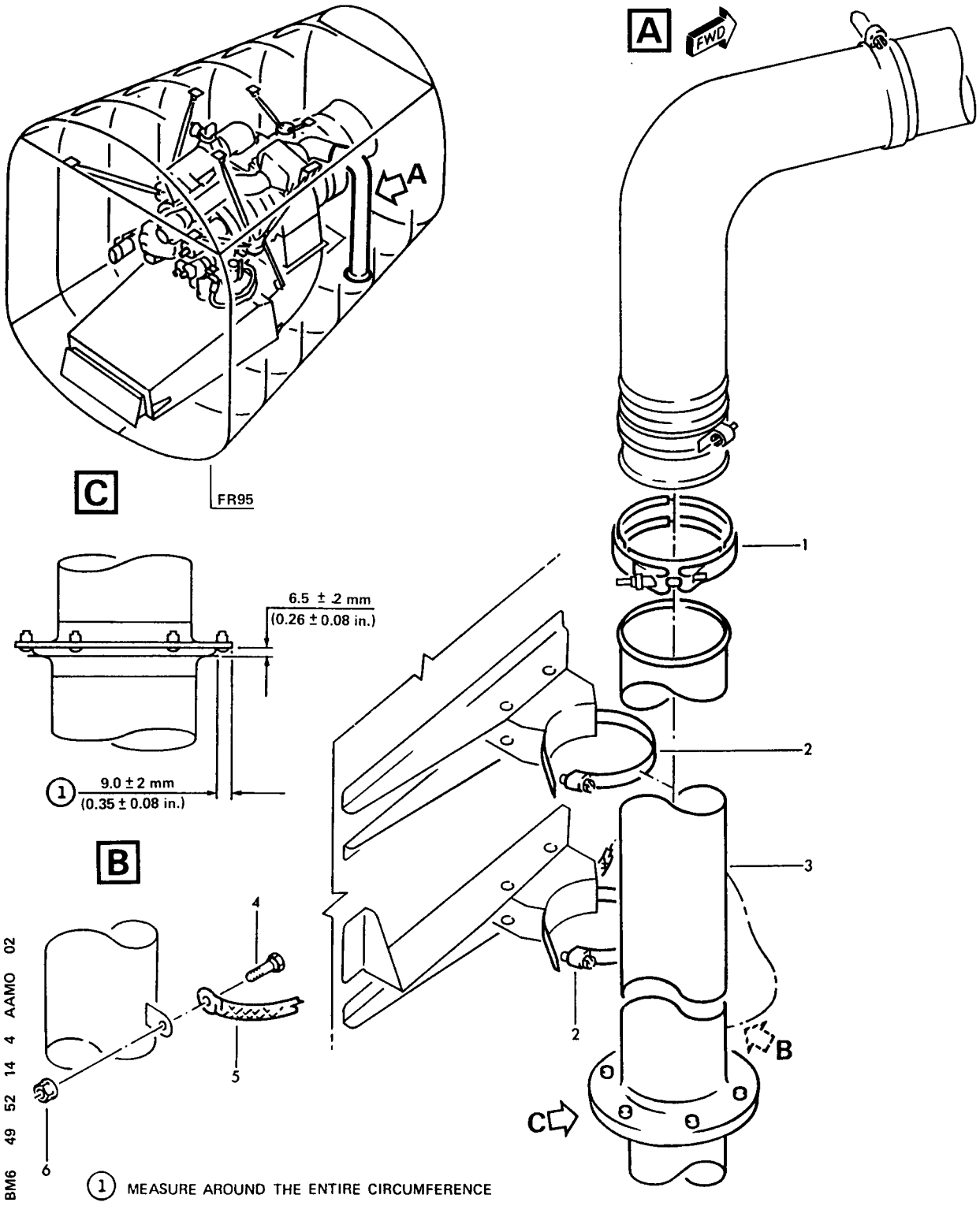
2. Procedure

(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KD	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



Oil Cooler Outlet Duct
Figure 401

R

(2)Position access platform and open access doors 315AL and 316AR.

B. Removal
(1)Remove nut (6), screw (4) and disconnect bonding strap (5).
(2)Release clamp (1).
(3)Support duct (3), remove clamps (2) and duct.
(4)Fit protective cover to open end of oil cooler outlet.

C. Preparation for Installation
(1)Visually inspect duct (3), and structural brackets for damage, chafing marks, dents or cracks.
(2)Visually inspect duct seal for damage. Replace if necessary.

D. Installation
(1)Remove protective cover.
(2)Position and support duct (3) and loosely install clamps (1, 2).
(3)Close access door 315AL and align duct (3) so that gap between duct and access door duct flanges measures 6.5 ± 2 mm (0.26 ± 0.08 in.). Tighten clamps (2) and check that duct connection is centered. The difference between flange diameters must be 9.0 ± 2 mm (0.35 ± 0.08 in.) around the entire flange circumference. Align by adjusting bracket attach bolts if necessary. Open access door.
(4)Tighten clamp (1).
(5)Connect bonding strap (5) with screw (4) and nut (6).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(3)Close access doors 315AL and 316AR and remove access platform.

COOLING FAN SHUTOFF VALVE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

R CAUTION : DO NOT FIT PRE MOD FAN ISOLATION VALVES TO THE APU IF THE
R PLUMBING MOD HAS BEEN CARRIED OUT. INSTALLATION OF PRE MOD
R FAN ISOLATION VALVES CAN CAUSE A FIRE HAZARD DUE TO OVERHEATING
R OF THE FAN DUCTING. (REFER TO ALLIED SIGNAL SERVICE BULLETINS
R 49-6994 AND 49-7193).

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Protective Covers
D.	Blanking Caps and Plugs
E.	Torque Wrench, up to 88.5 lbf.in. (1.0 m.daN)
F.	Corrosion-Resistant Steel Lockwire, 0.032 in (0.8 mm) dia.

Referenced Procedure

- 49-10-00, P. Block 501	Power Plant

2. Procedure

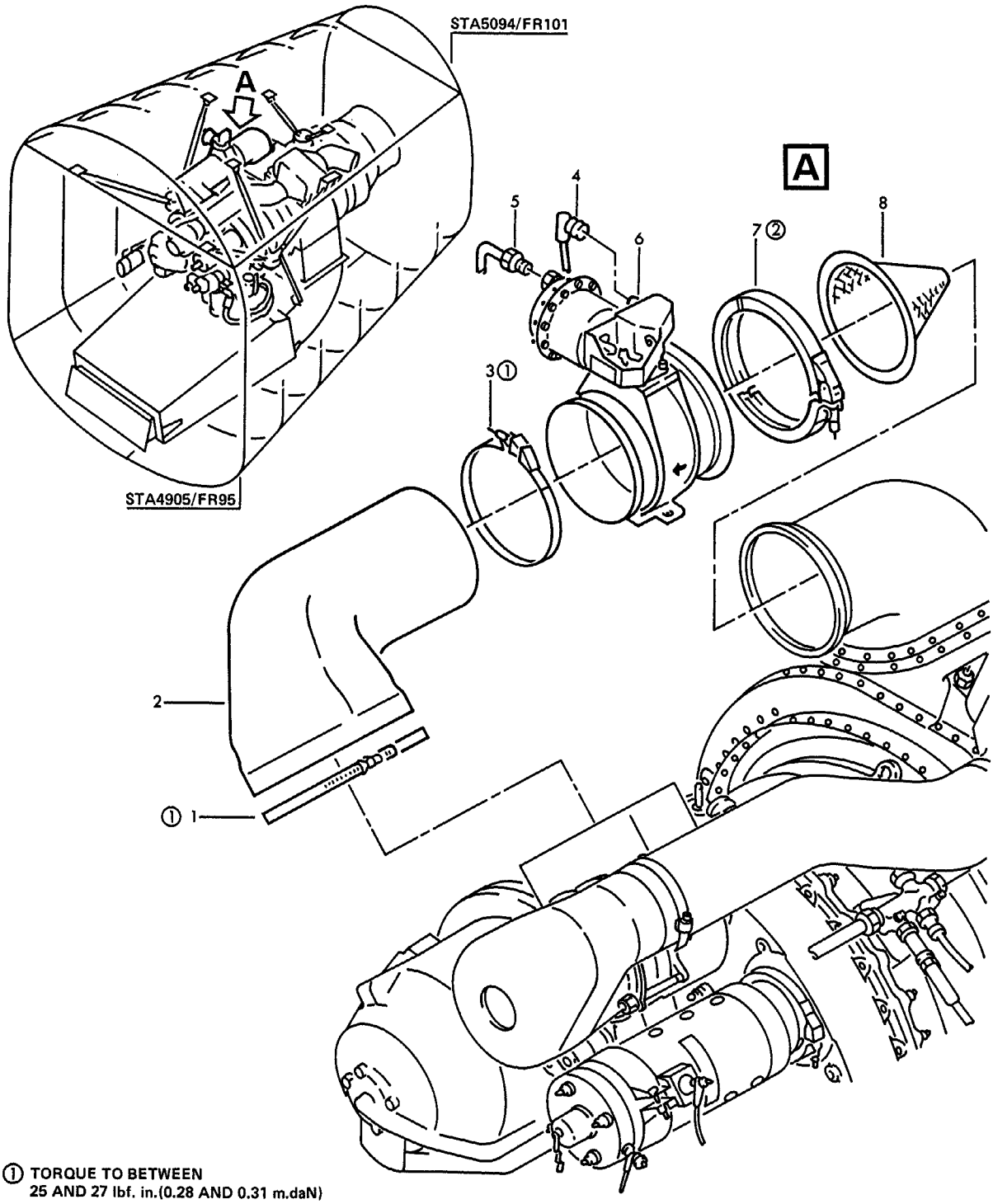
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/FUEL/BLOW OFF/CTL	10QC	A51
131VU	APU/FUEL/BLOW OFF/PUMP	11QC	A52

(2)Position access platform and open access doors 315AL and 316AR.



Cooling Fan Shutoff Valve
Figure 401

B. Removal

NOTE : Fit protective covers or blanking caps and plugs to disconnected line, ducts and electrical connector.

(1)Cut and remove lockwire from electrical connector P24 (4).
  (a)Remove electrical connector P24 (4).
(2)Remove pneumatic line (5).
(3)Release clamps (1, 3).
  (a)Remove cooling fan inlet duct (2).
(4)Support cooling fan shutoff valve (6).
  (a)Remove clamp (7), cooling fan shutoff valve (6) and screen (8).

C. Preparation for Installation

(1)Check cooling fan shutoff valve (6) for damage. Replace if necessary.
(2)Check screen (8) wire mesh and mount flange for damage. Replace if necessary.
(3)Check clamps (1, 3, 7) for damage. Replace if necessary.
(4)Check cooling fan inlet duct (2) for damage. Replace if necessary.

D. Installation

NOTE : Remove protective covers and blanking caps and plugs from line, ducts and electrical connector before connection.

(1)Position screen (1).
(2)Position cooling fan shutoff valve (6) and install clamp (7).
(3)Position cooling fan inlet duct (2) and install clamps (1, 3).
(4)Align cooling fan shutoff valve (6) with pneumatic line (5).

CAUTION : TO AVOID DAMAGE OF MOUNTING SURFACES DO NOT OVERTORQUE CLAMPS.

(5)TORQUE clamp (7) to 45 lbf.in. (0.51 m.daN).
  (a)TORQUE clamps (1,3) to between 25 and 27 lbf.in. (0.28 and 0.31 m.daN).
(6)Connect pneumatic line (5).
  NOTE : Make certain that installation is tension free.
(7)Connect electrical connector P24 (4).
  (a)Safety connector P24 (4) with lockwire.
(8)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 10QC, 11QC and 71KD.

E. Test

(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(2)Check cooling fan shutoff valve connections for leakage.
(3)Shut down APU.

F. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

COOLING FAN SHUTOFF VALVE INLET SCREEN CLEANING/PAINTING

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : CLEANING AGENTS (MAT. NO. 11-002 AND 11-004) ARE DANGEROUS. USE IN A WELL VENTILATED AREA. DO NOT GET ON SKIN OR BREATHE FUMES.
WARNING : DO NOT GET CLEANING AGENT (MAT. NO. 11-503) ON SKIN AS IT WILL CAUSE BURNS.
WARNING: USE CORRECT PROTECTIVE EQUIPMENT WHEN USING COMPRESSED AIR OR CLEANING AGENTS.

1. Reason for the Job

A. Inlet screen clogging

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Dry Compressed Air
C.	Vapour Degreaser
D.	Protective Gloves and Goggles
E. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
F. Material No. 11-004	Cleaning Agents (Ref. 20-31-00)
R G. Material No. 11-024	Cleaning Agents (Ref. 20-31-00)
H.	Spray Gun

Referenced Procedures

- 49-52-17, P. Block 401	Cooling Fan Shutoff Valve

3. Procedure

A. Job Set-Up
(1)Remove cooling fan shutoff valve (Ref. 49-52-17 P. Block 401).

B. Cleaning
WARNING : CLEANING AGENTS (MAT. NO. 11-002 AND 11-004) ARE DANGEROUS. DO NOT GET ON SKIN OR BREATHE THE FUMES.

WARNING : USE CORRECT PROTECTIVE EQUIPMENT WHEN USING COMPRESSED AIR AND CLEANING AGENTS.

(1)Method 1.
(a)Remove dirt and grease from inlet screen with cleaning agent (Mat. No.11-002). Use a spray gun or a stiff bristle brush.
(b)Dry with compressed air (max 30 psi).
(c)Inspect inlet screen, if damaged, replace.
(2)Method 2.
(a)Place inlet screen in a vapour degreaser filled with cleaning agent (Mat. No.11-004) at a temperature of 74 °C to 77 °C (165 °F to 170 °F).
(b)Remove when clean and dry with compressed air (max 30 psi).
(c)Inspect inlet screen, if damaged, replace.
(3)Method 3 (to remove heavy contamination).
(a)Clean inlet screen using method 1 or 2.
R WARNING : DO NOT GET CLEANING AGENT (MAT. NO. 11-024) ON SKIN AS IT WILL CAUSE BURNS.
R (b)Put inlet screen in cleaning agent (Mat. No. 11-024) for a maximum time of 30 minutes.
(c)Clean with a stiff fibre brush.
(e)Flush inlet screen thoroughly with clean water at a temperature of 27 °C to 43 °C (80 °F to 110 °F).
(f)Dry with compressed air (max 30 psi).
(g)Inspect inlet screen, if damaged, replace.

C. Close-Up
(1)Install cooling fan shutoff valve (Ref. 49-52-17 P. Block 401).
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

1. General

A. The engine controls consist of manual and automatic controls for starting, shutdown, and maintaining the APU within safe limits during operation. Once a start is initiated, control of the APU is fully automatic and self monitoring. It is provided by the Electronic Control Box (ECB), which receives its inputs from the relevant sensors installed on the APU.

B. Power Control (Ref. 49-61-00 P. Block 1)
The APU power control system is designed to:
(1)Maintain automatic APU operation.
(2)Maintain a constant APU speed.
(3)Protect APU from damage in case of failure or overload.
(4)Enable APU to provide pneumatic and shaft power.
(5)Carry out self-testing.

C. APU Emergency Shutdown (Ref. 49-62-00 P. Block 1)
In addition to normal shutdown, the APU is protected by an automatic shutdown system which responds to certain system malfunctions and to an emergency switch signal conditioner which processes manual external shutdown switch signals or automatic fire detection shutdown signals.
An emergency shutdown of the APU occurs when a ground signal is transmitted to the ECB emergency shutdown input.

POWER CONTROL - DESCRIPTION AND OPERATION

1. General

A. The APU power control system is designed to:
(1)Maintain automatic APU operation.
(2)Maintain a constant APU speed.
(3)Protect APU from damage in case of failure or overload.
R (4)Enable APU to provide pneumatic and electrical power.
(5)Carry out self-testing.

2. Component Location

**ON A/C 001-004, 006-100,

(Ref. Fig. 001)

R **ON A/C 101-200,

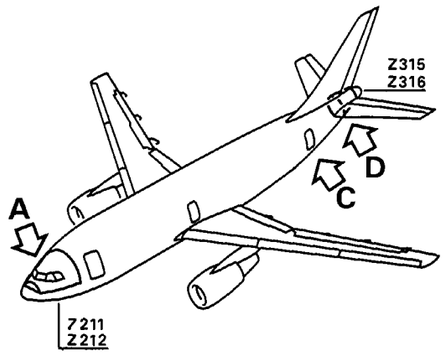
(Ref. Fig. 002)

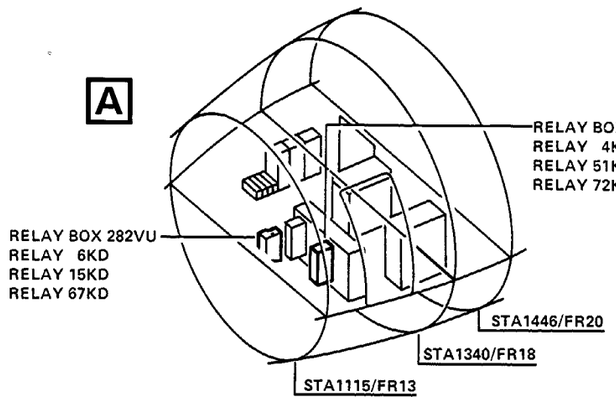
**ON A/C 005-005,

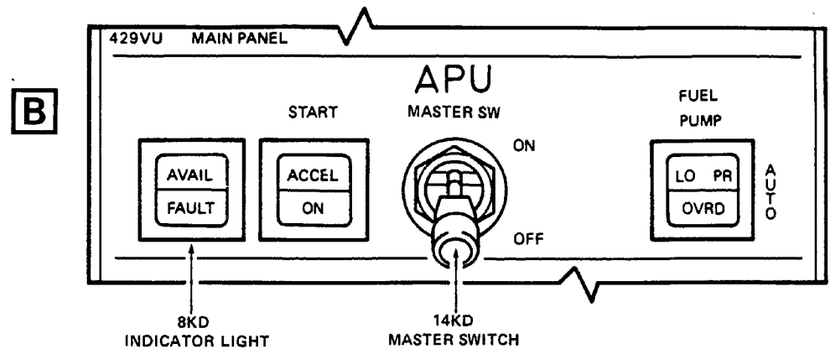
(Ref. Fig. 003)

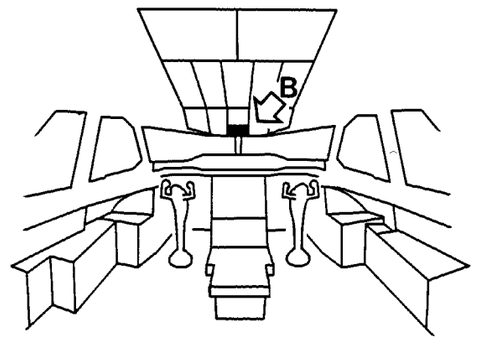
**ON A/C ALL

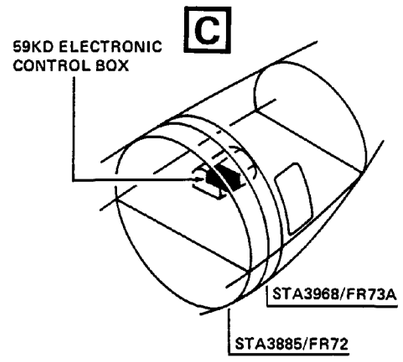
FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	FUEL CONTROL UNIT		316	316AR	49-32-11
4KD	RELAY-APU MAIN	107VU	121	132AZ	
6KD	RELAY-95%	282VU	122	132AZ	
8KD	INDICATOR LIGHT-AVAIL/FAULT	429VU	212		
14KD	SWITCH-APU MASTER	429VU	212		
15KD	RELAY-FAULT	282VU	122	132AZ	
51KD	RELAY-7%	107VU	121	132AZ	
52KD	MFA ECB BITE DISPLAY	472VU	212		
59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11
67KD	RELAY-AUTOMATIC RESET AVOID	282VU	122	132AZ	
72KD	RELAY-BACK UP PWR CTL 3 SEC	107VU	121	132AZ	

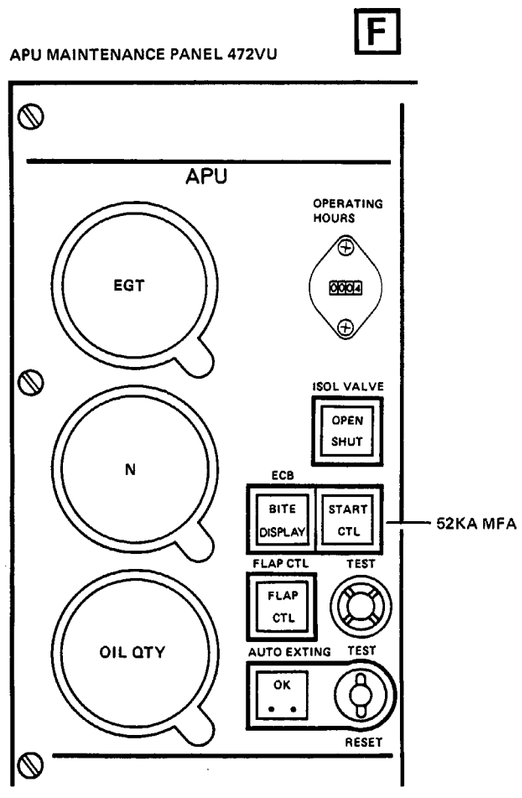


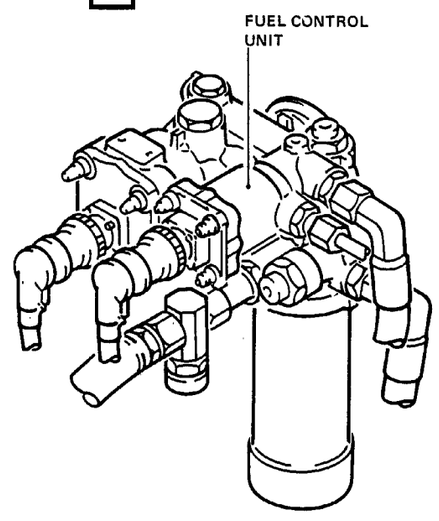


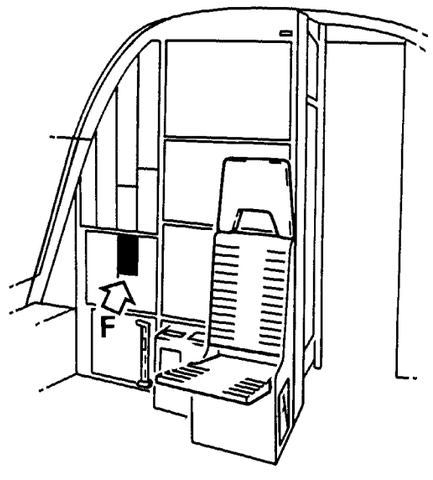


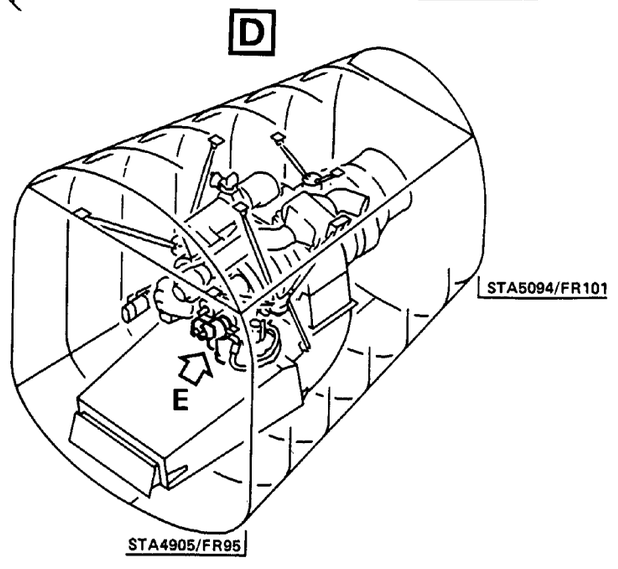




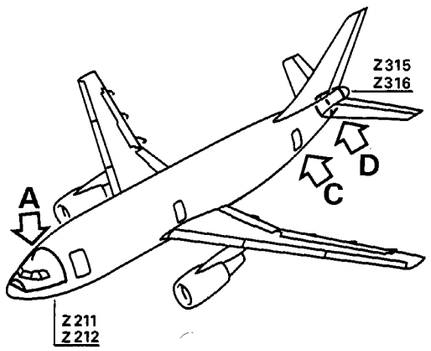


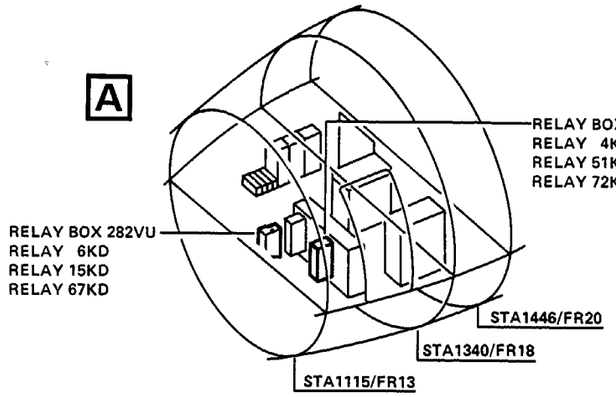


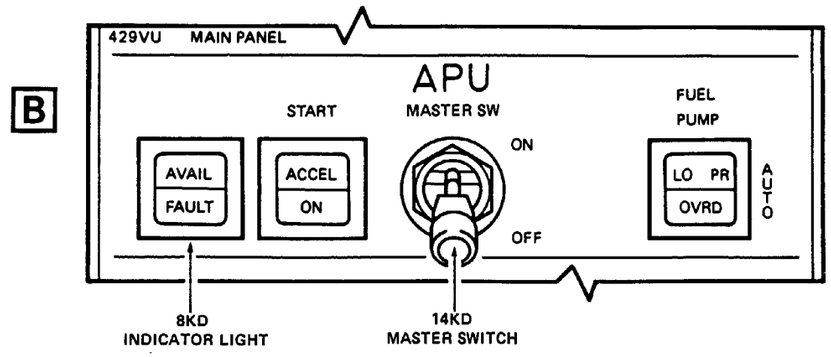


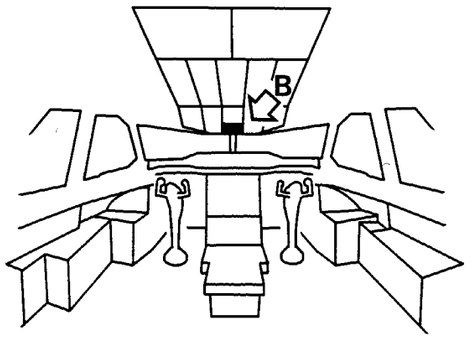


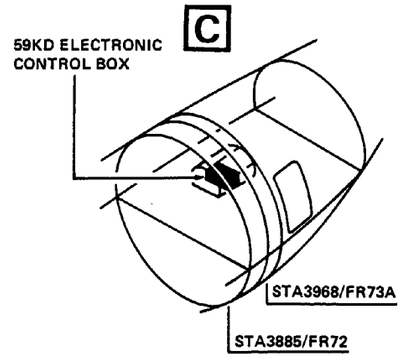
Power Control
Figure 001

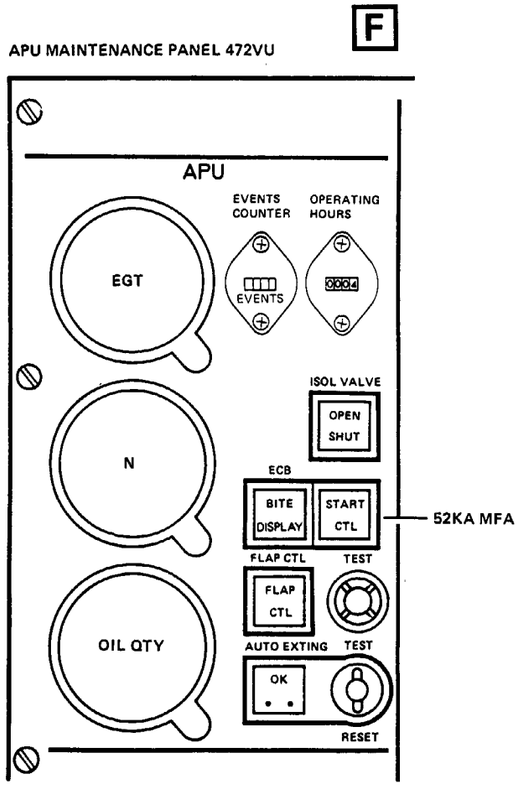


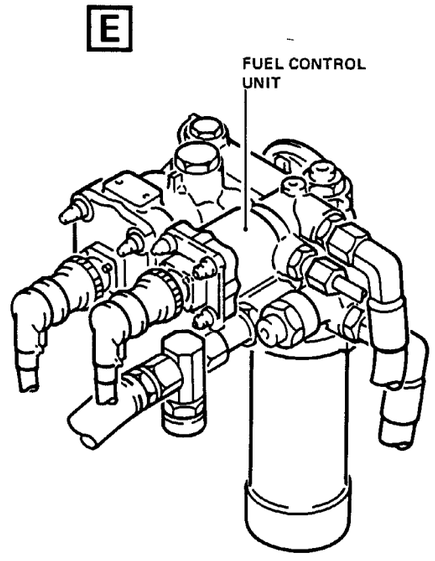


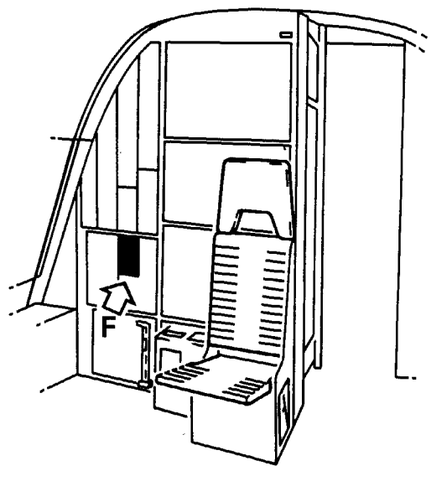


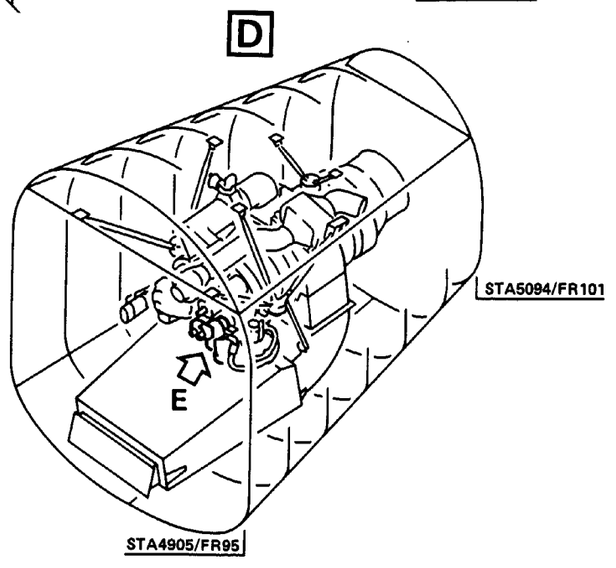




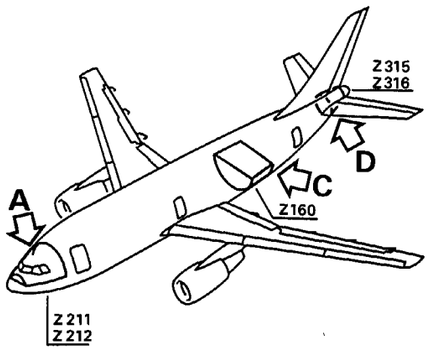


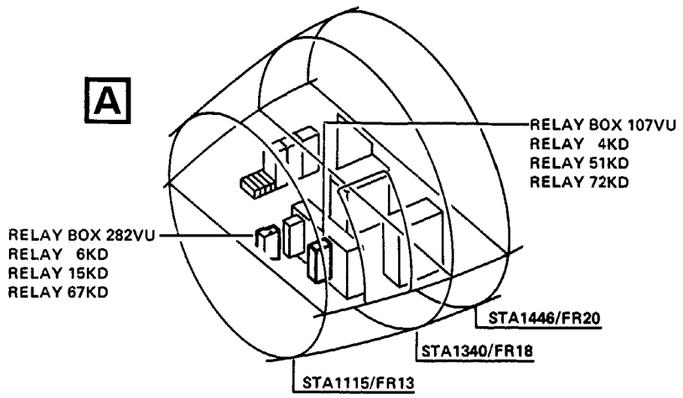


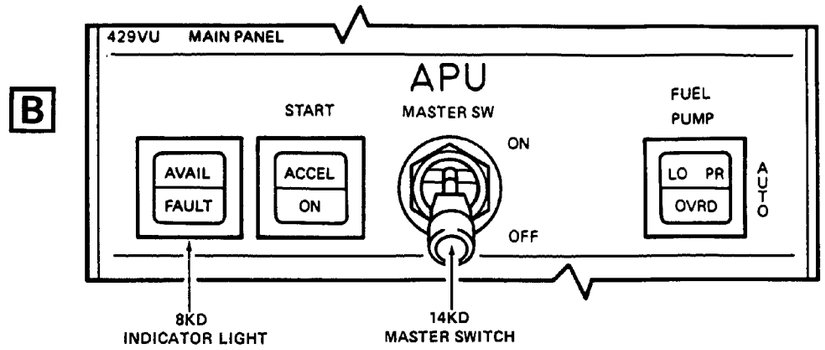


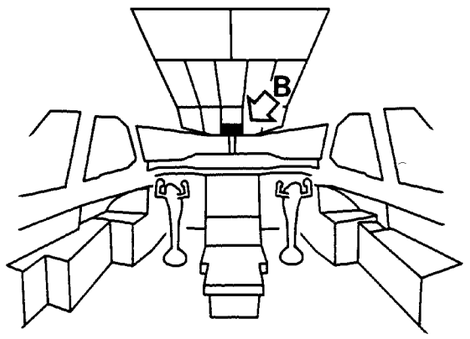


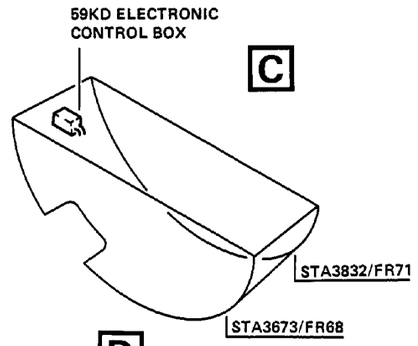
Power Control
Figure 002

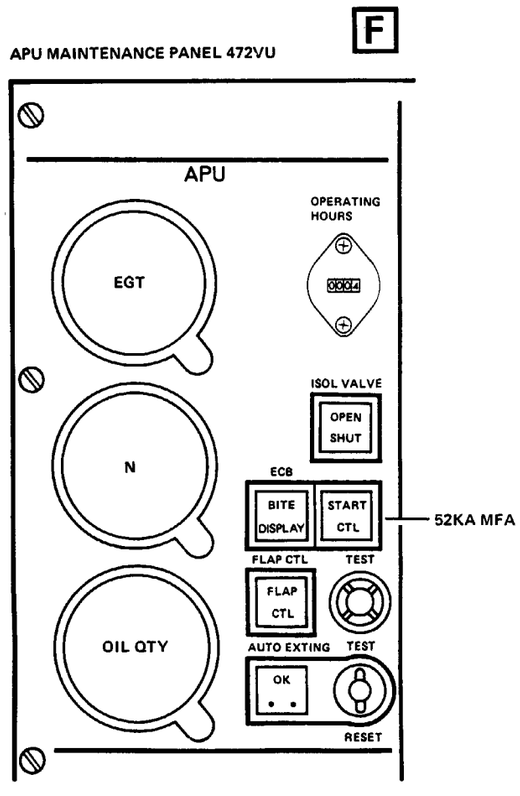


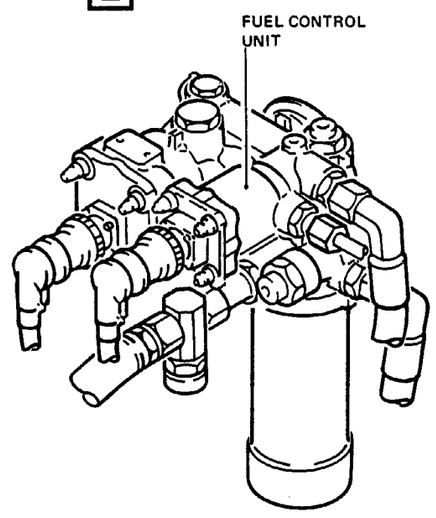


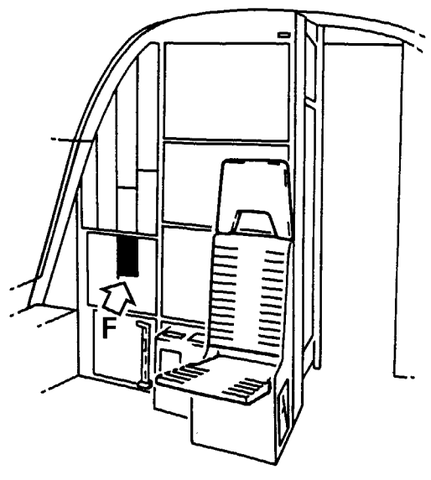


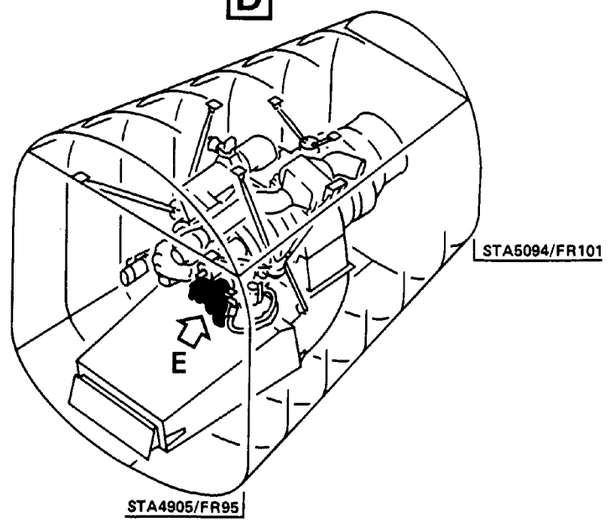










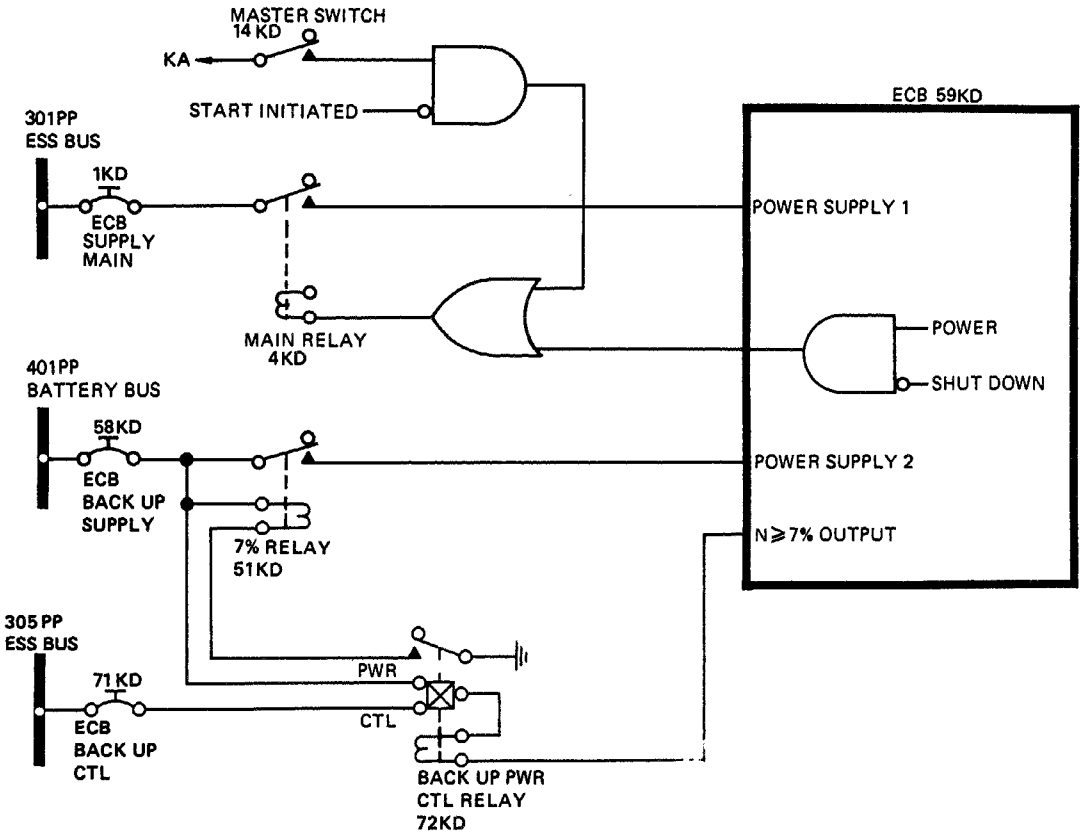


Power Control
Figure 003

3. Description

A. The power control system comprises the following components:
- Electronic Control Box (ECB)
- Fuel Control Unit (FCU) (Ref. 49-30-00)
- Fuel Flow Divider and Valve Assembly (Ref. 49-30-00)
- Starter Motor, Ignition Unit and Igniter Plugs (Ref. 49-40-00)
- Surge Control Valve and Pneumatic Pressure Sensor (Ref. 49-51-00)
- Monopol Speed Sensor (Ref. 49-71-00)
- EGT Thermocouple Sensor (Ref. 49-72-00)
- Oil Switches LOP and HOT (Ref. 49-94-00)
- Load Compressor Inlet Temperature (LCIT) Sensor (Ref. 49-23-00)
- Oil Pumps, Oil Cooler and Oil Pressure Regulator (Ref. 49-90-00)
- Cooling Fan (Ref. 49-52-00)
- APU Control Panel

B. Electronic Control Box (ECB)
(Ref. Fig. 004)
(Ref. Fig. 005)
The main component of the control system is the ECB.
(1) The ECB is a microprocessor-based digital control system. The Intel 8086 microprocessor CPU is used to execute the contents of a program stored in ROM. This program implements the control and internal testing of the system. Results of intermediate calculations that continuously change (such as fuel schedules and speed rate commands), operational and test status flags, and software computational temporary data are stored in RAM. The system has 24000 words of ROM and 1024 words of RAM. One word is 16-bit wide. In addition, the ECB has the capability of storing certain data in nonvolatile EAROM.
(2) The ECB is a fully digital electronic controller that performs the main part of the APU system logic for all modes of engine operation including self-testing, shutdown protection and continuous monitoring of essential APU parameters as follows:
(a) Start sequence
(b) Start
(c) Speed (RPM)
(d) Operating temperature (EGT)
(e) Shutdown sequence
(f) Automatic shutdown
(g) Bleed air



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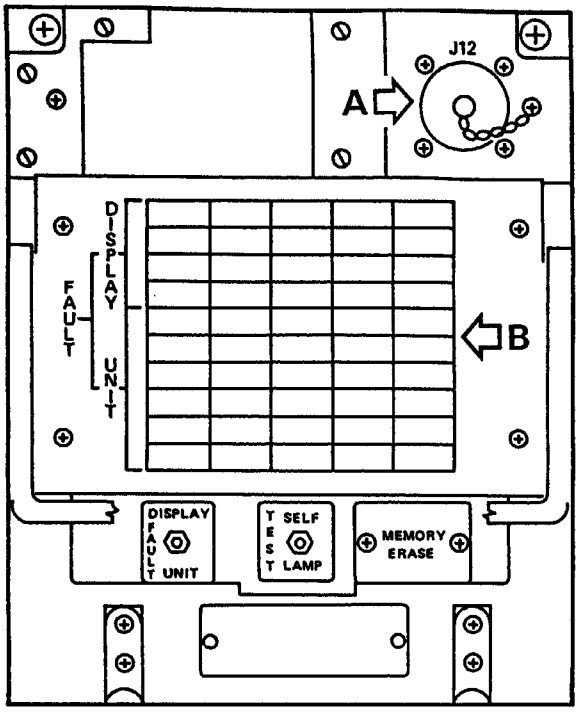
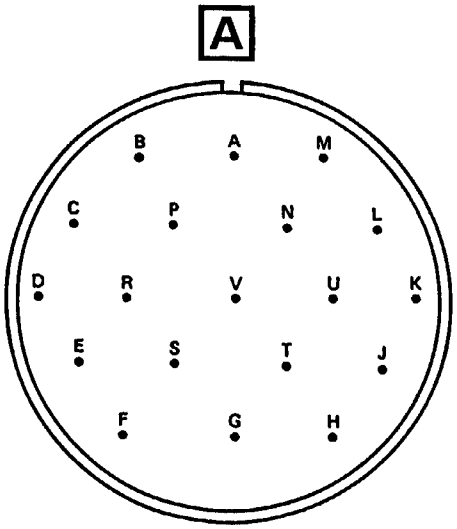
ECB Supply
Figure 004





ECB FRONT PANEL

B

DISPLAY

SPARE	ECB	NO ACCEL	SLOW START	NO FLAME
RVRSE FLOW	FAN VALVE	LOSS DC PWR	LOP	SPARE
INLET DOOR	O'CURR	S/D CKT	HOT	O'SPD
GEN HOT	SPARE	FIRE EMERG	O'TEMP	FAILED SENSOR

FAULT UNIT

FAN VALVE	LCIT SENSOR	FUEL SOL	PT SENSOR	ΔP SENSOR
# 1SPD	# 2 SPD	LOP SW	FUEL CONTROL	SURGE VALVE
# 1 T/C RAKE	# 2 T/C RAKE	IGV ACT	IGN UNIT	DEOIL SOL
FLOW DVDER	ECS CONTRL	APU STARTR	STARTR CKT	HOT SENSOR
P2 SENSOR	ECB	LD VAL SOL	SPARE	SPARE
SPARE	SPARE	SPARE	WAIT	TST OK

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ECB Front Panel (For ECB P/N 2117402-9 and subsequent)
Figure 005

R **ON A/C 001-004, 006-200,

(3)The ECB 59KD, is installed in the passenger compartment on the LH side in the lateral overhead stowage compartment between frames 72 and 73.

**ON A/C 005-005,

(3)The ECB 59KD, is installed in the bulk cargo compartment beside the bulk cargo door between frames C69 and C70 on the RH side.

**ON A/C ALL

(4)Electrical power is supplied from the aircraft 28 V DC busbars to the ECB by two supply lines.
(a)Power supply I from the essential bus 301PP via circuit breaker 'ECB SUPPLY MAIN' 1KD and APU Main Relay 4KD.
(b)Power Supply II from the battery bus 401PP via circuit breaker 'ECB SUPPLY BACK UP' 58KD and 7% Relay 51KD.
(5)The power supply is monitored and controlled to inhibit the failed power supply should the voltage exceed a safe limit. A safe APU shutdown will be conducted should any power supply failure occur that would result in an unsafe APU operation.
(6)ECB input and output signals.
(a)A/C Input Signals to ECB

Input Signal	Signal	Condition
Master SW switch OFF	Ground	No power to ECB/APU shutdown
Master SW switch ON	Open	Power to ECB/APU run
START pushbutton pressed	28 V DC	APU start
Air intake flap position open	28 V DC	APU start/run
Air intake flap position not open	Open	APU shut down/no start
ECS air demand	0 to 10 V DC	Analog
MES	28 V DC	APU MES mode
Emergency shutdown	Ground	APU emergency shutdown
Emergency shutdown	Open	APU start/run
Bleed air valve	Ground	APU bleed air
Bleed air valve	Open	APU no bleed air
Air/Ground signal	Ground	A/C on ground
Air/Ground signal	Open	A/C in flight condition
A310/A300 Signature	Ground	A310
De-ice	Open 28 V DC	APU DE-ICE mode
Generator HOT	Ground	APU Generator high temperature

(b)ECB Output Signals to A/C

Output Signal	Signal	Load Steady State	Condition
Generator ready to load	28 V DC	400 mA	PU min. 2 sec. 95 % RPM
Start contactor	28 V DC	2 A	
EGT	0 to 1 mA	1 mA	Analog, 1 mA = 900 °C (1652 °F)
RPM	0 to 1 mA	1 mA	Analog, 1 mA = 120 % RPM
APU fault	Ground	400 mA	
BITE information indicator	28 V DC	100 mA	Faulty data on ECB front panel display
N > 7 %	Ground	400 mA	
N > 60 %	28 V DC	200 mA	
A/C main relay	28 V DC	400 mA	MASTER SW switch ON

(c)ECB Output Signals to APU Loads
- Fuel solenoid
- Fuel control TM (Torque Motor)
- Ignition unit driver
- Surge control valve TM
- Inlet guide valve TM
- Flow divider solenoid
- Deoil solenoid
- Bleed Load Valve

(d)APU Input Signals to ECB
- EGT (T5) chromel-alumel thermocouples (redundant)
- Monopole transducer (APU speed) (redundant)
- HOT sensor
- LOP switch
- LCIT chromel-alumel thermocouple
- Compressor inlet pressure sensor (P2)
- Delta pressure (ΔP) transducer
- Total pressure (PT) transducer
- Generator scavenge oil filter P
- Fan valve position switch
- IGV actuator (LVDT)
- Starter voltage

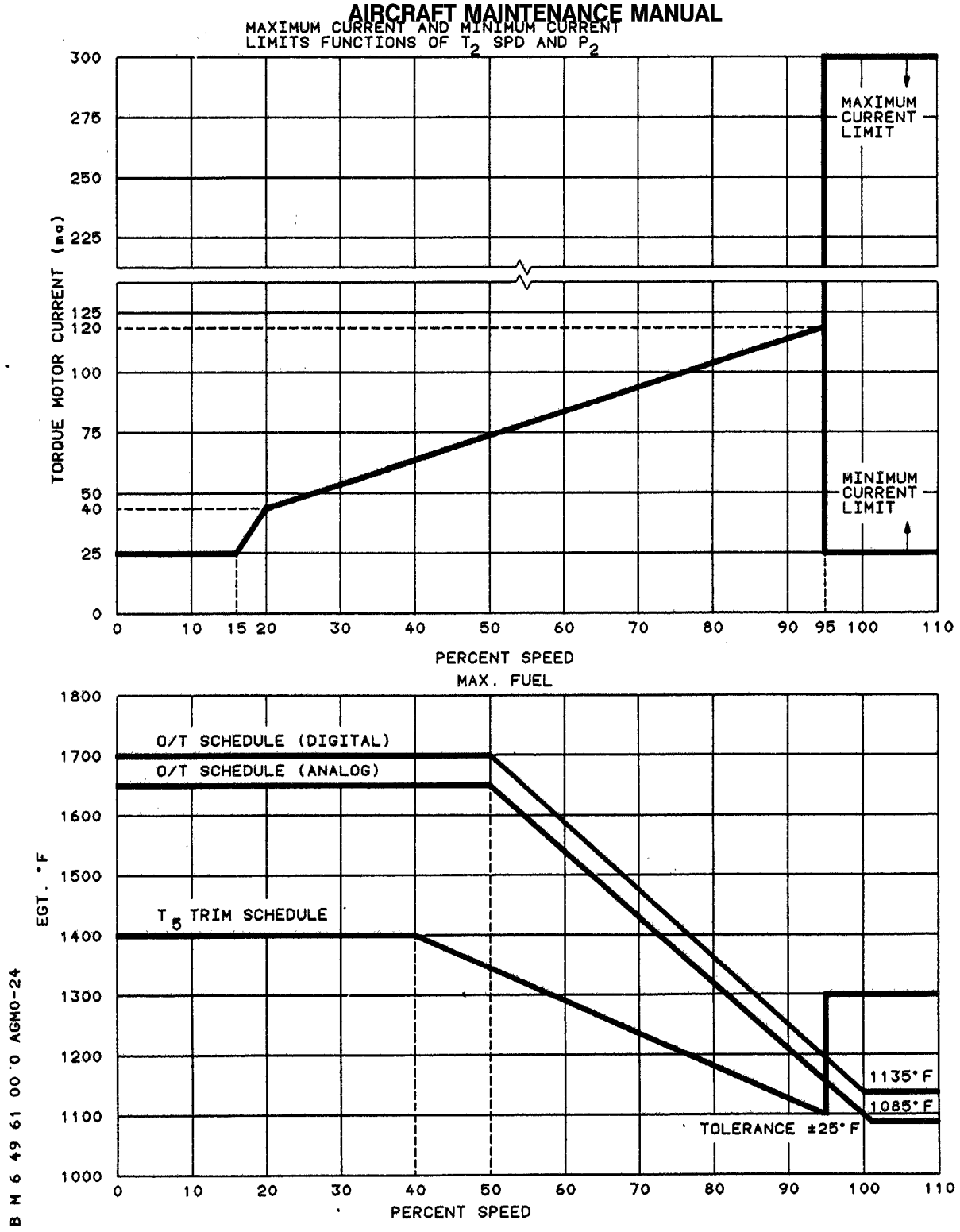
ECB fault is stored in memory, the APU fault relay is energized, and the power is disconnected.

(e)ECB P/N 2117402-11 and subsequent output signals to J12 test connector (Ref. Fig. 005).
Inlet Guide Vane Torque Motor (Pin U)
Surge Control Valve Torque Motor (Pin V)
Fuel Control Unit Torque Motor (Pin E)

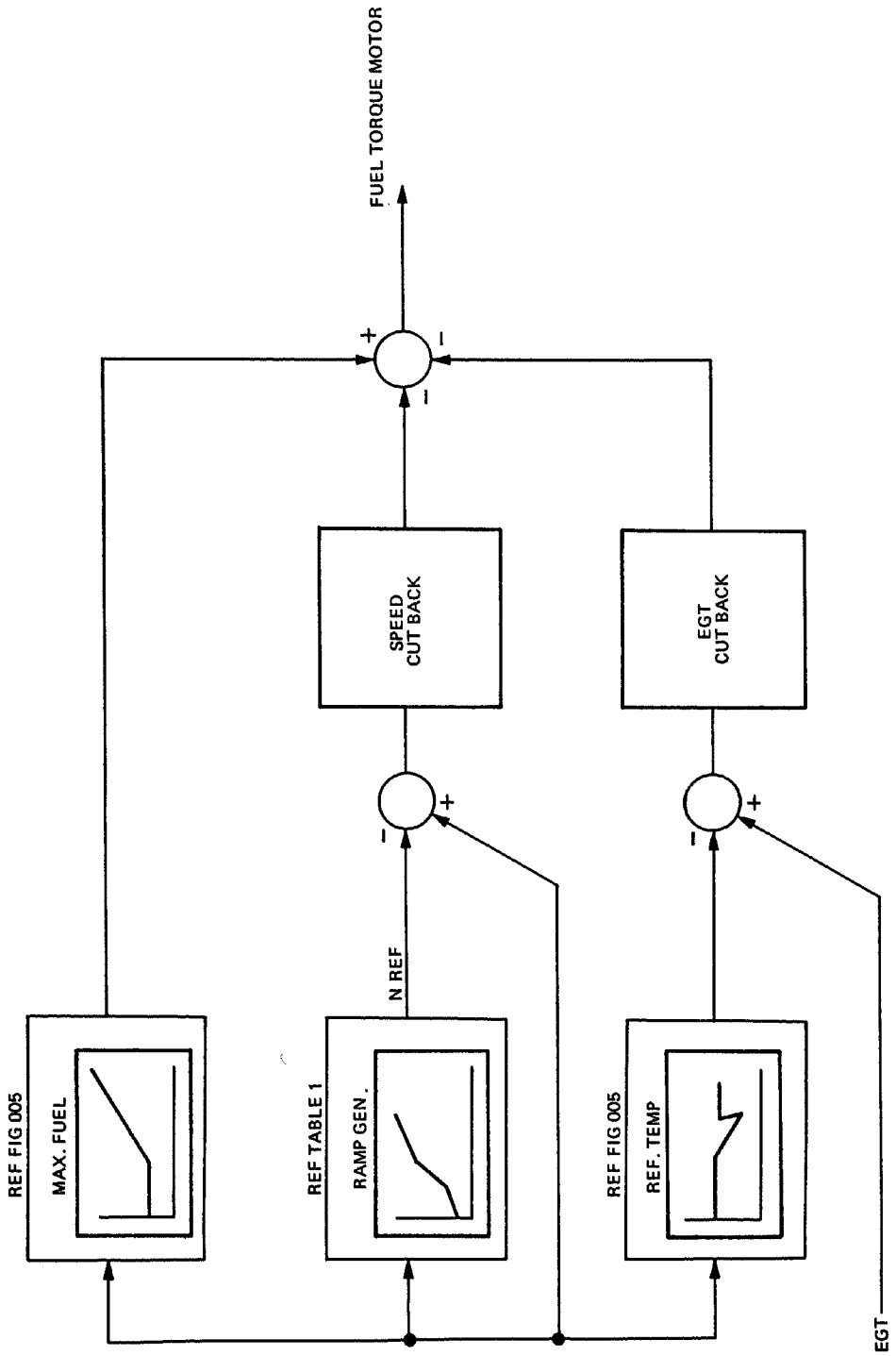
C. Speed Control
(Ref. Fig. 006, 007)
(1)Timed Acceleration Loop
(a)The function of the timed acceleration loop is to control the fuel in a manner which causes the APU speed to increase from 0 to 95% at constant rates including temperature restraints. After completion of the prestart BITE test, maximum acceleration fuel is generated by a control schedule. The maximum acceleration fuel, which is a function of the APU speed, may be reduced by a speed and/or a temperature correction. A reference speed (N) is computed by the ramp generator; the ramp generator produces the NREF at constant rates that are a function of the APU speed (N). A speed correction is computed by summing the APU speed with the reference speed (If the speed correction becomes negative, the ramp stops until the APU speed is greater than the reference speed). A maximum exhaust gas temperature reference is computed from a control scheduled as a function of the APU speed. A temperature correction is computed by summing the APU Exhaust Gas Temperature (EGT) with the maximum temperature. The speed and temperature corrections are multiplied by appropriate gains, limited, and summed with the maximum acceleration fuel to produce a command to the fuel torque motor.
(b)Table 1

Acceleration Limits

From - To (% speed)	Acceleration Limit (% RPM/sec)
16 - 35	1.0
35 - 50	1.75
50 - 95	2.75



EGT Trim Schedule
Figure 006



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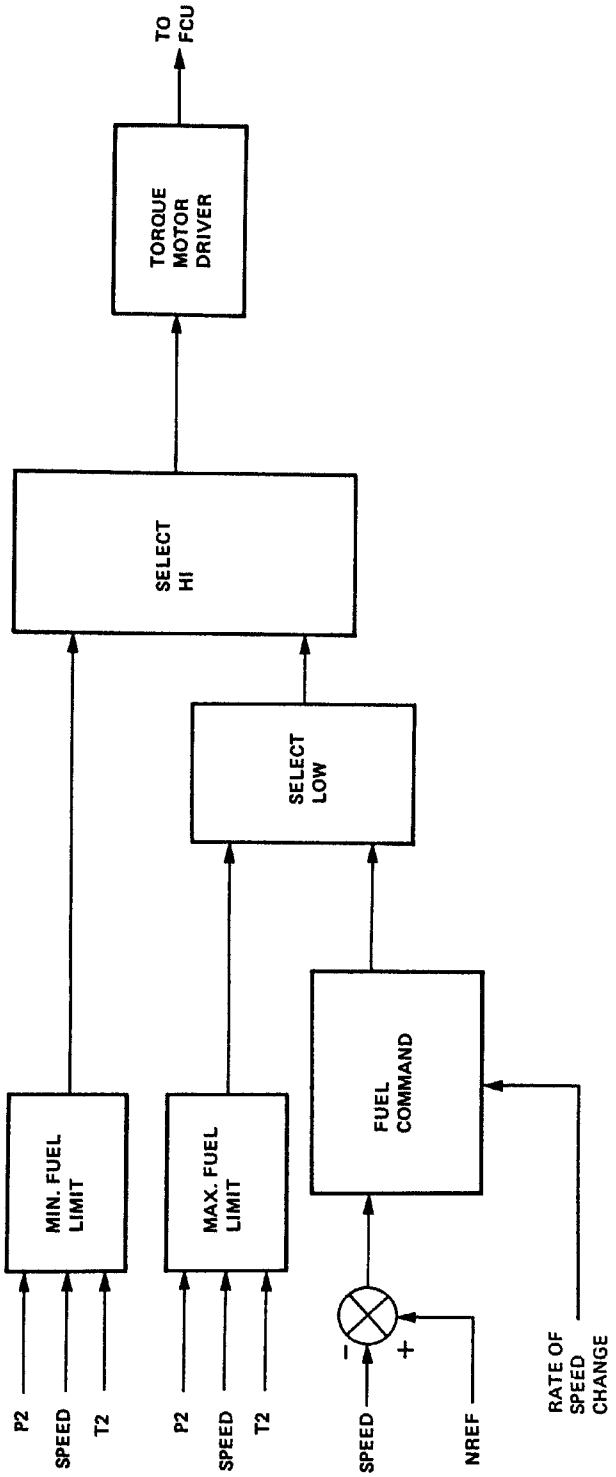
Acceleration Control Loop
Figure 007

(2)Governed Speed Control
(Ref. Fig. 008)
(a)There are three governed speeds:
- ECS speed is 40142 RPM (100% ±0.75%)
- MES speed is 40712 RPM (101.4%)
- De-ice speed is 41142 RPM (102.5% ±0.75%).

For all computations, including speed switch points and the RPM indication, 40142 RPM corresponds to 100% speed throughout the operating temperature range. Tolerance for all governed speeds is ±0.25% from 65° to 95°F (18 to 35°C). Speed control is a proportional-plus-integral control, with set points that reset to achieve the governed speeds. The transition rate to complete a speed shift, up or down, is 0.83% per second with a maximum instantaneous speed change rate of 400 revolutions per second.

(b)The function of the on-speed governor loop is to control the fuel in a manner which minimizes the difference between the APU speed and set point. The operation of this control loop is shown in (Ref. Fig. 007). A speed error is computed as the difference between the reference speed and the actual speed.

(c)The fuel command is compared to the limits for maximum and minimum fuel. The limits are functions of the APU speed, the APU inlet temperature (T2) and the APU inlet pressure (P2). The maximum limit provides APU surge protection; the minimum limit provides APU flameout protection.



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On Ground Speed Governed Control
Figure 008

D. IGV Control
(Ref. Fig. 009, 010, 011)
(Ref. Fig. 012)

(1) The ECB positions the IGVs in accordance with the operating mode and the IGV position limits. These limits are functions of the external adjustments for ECS min., ECS norm., ECS cold and MES at the ECB switch module. The function of these limits is to reduce power section performance to save fuel and extend the life of the APU. The IGV position command is compared to actual IGV position, which is updated every 20 milliseconds. The resulting error signal is summed with the IGV temperature trim. A rate ramp has been implemented so that 5 seconds is required to fully stroke the IGVs in either direction on the command signal. The logic, with a 60 millisecond delay, quick-dumps the vanes closed when a decreasing shock load rate of 250 Hz/sec is experienced. Once closed by this logic, the IGVs remain closed for 5 seconds. An additional set point, based on altitude (P2 pressure), closes the IGVs at 23,000 feet increasing and opens the IGVs at 21,000 feet decreasing.

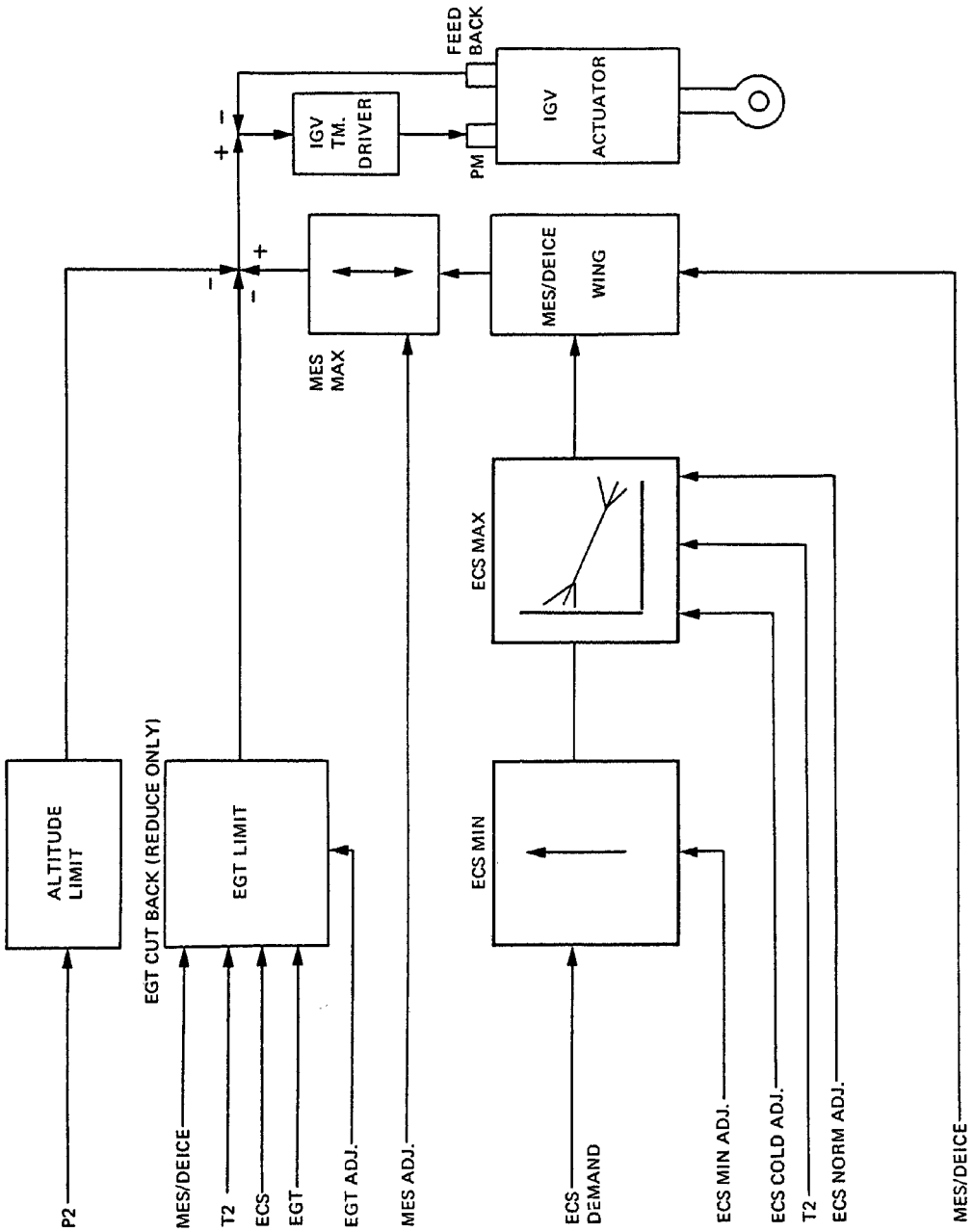
(2) When the ECS mode is commanded, IGV position varies in proportion to the ECS signal. The ECS command usable range is 0 V DC to 10 V DC. Any ECS signal out of this range is considered a fault and the IGV voltage is set to the maximum ECS position. The ECS maximum IGV voltage versus ambient temperature (T2) and knob setting for mode is shown (Ref. Fig. 010).
The required value accuracy is 2.5%.

(3) The T5 trim schedule.
(Ref. Fig. 012, 011)
The IGV position is corrected as a function of T5 and inlet temperature T2. MES selection automatically goes to the higher curve. The EGT °F front panel adjustment lowers the T5 trim schedule proportionally in increments of 25°F (14°C).
The maximum reduction is 100°F (56°C) (Ref. Fig. 011). Position E reflects the IGV trim schedule as shown in (Ref. Fig. 011).

E. Surge Control
(Ref. Fig. 013)

(1) The ECB controls the SCV to prevent surging of the APU load compressor. The total pressure sensor and static pressure sensor measures the total pressure (PT) and pressure drop (delta P) at the load compressor discharge. The total pressure transducer and the delta pressure transducer transfers them into electrical signals and are sent to the ECB surge control logic.

(2) The surge control logic is shown in (Ref. Fig. 013). The load compressor pressure ratio set point is a function of the IGV position. The set point is biased from the nominal value for operation at altitude. The actual APU load compressor pressure ratio is formulated by dividing the pressure drop by the total pressure. The pressure ratio error is completed by the ECB as the difference between the set point and the actual pressure ratio. This error forms the command to the SCV torque motor.



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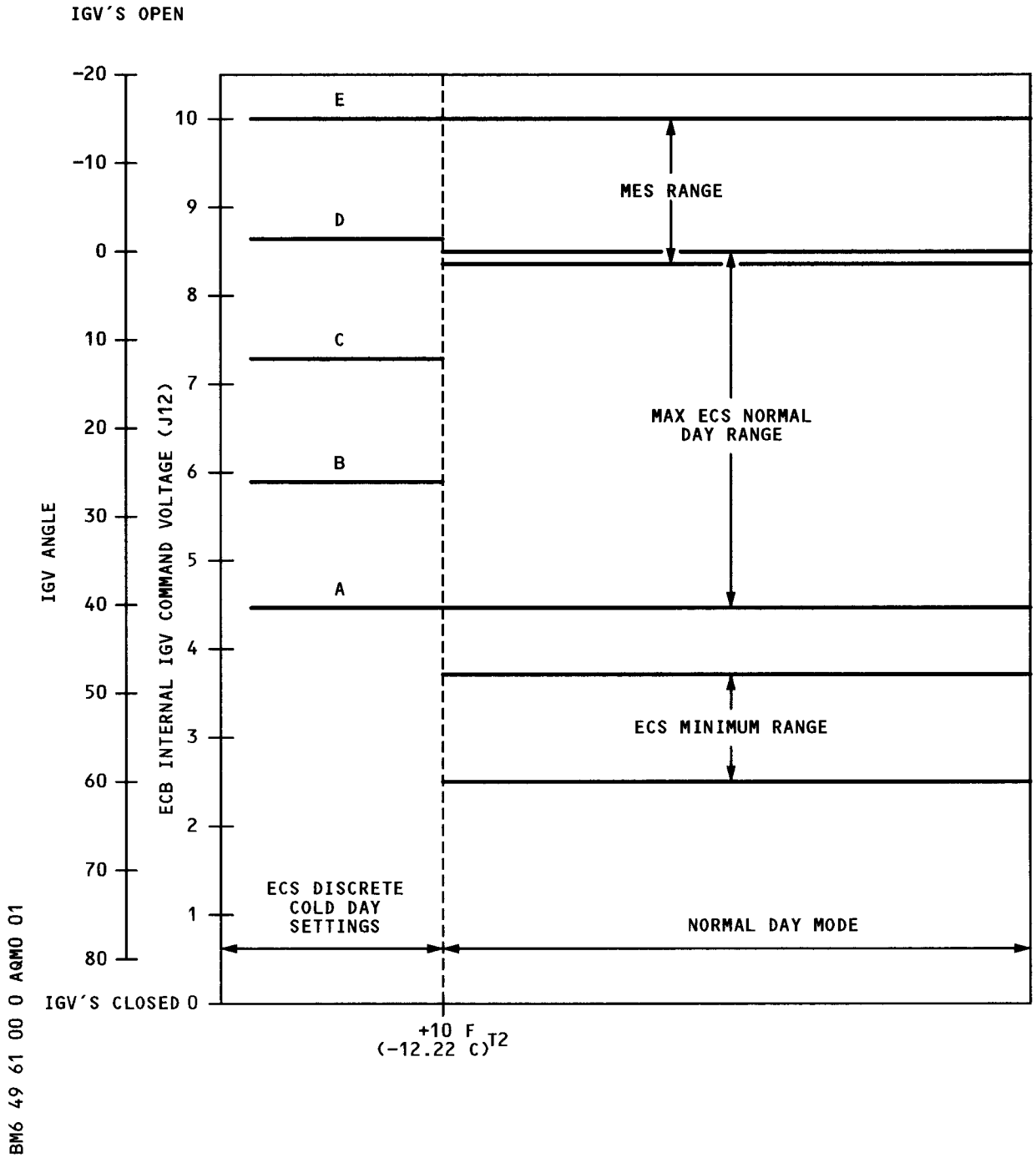
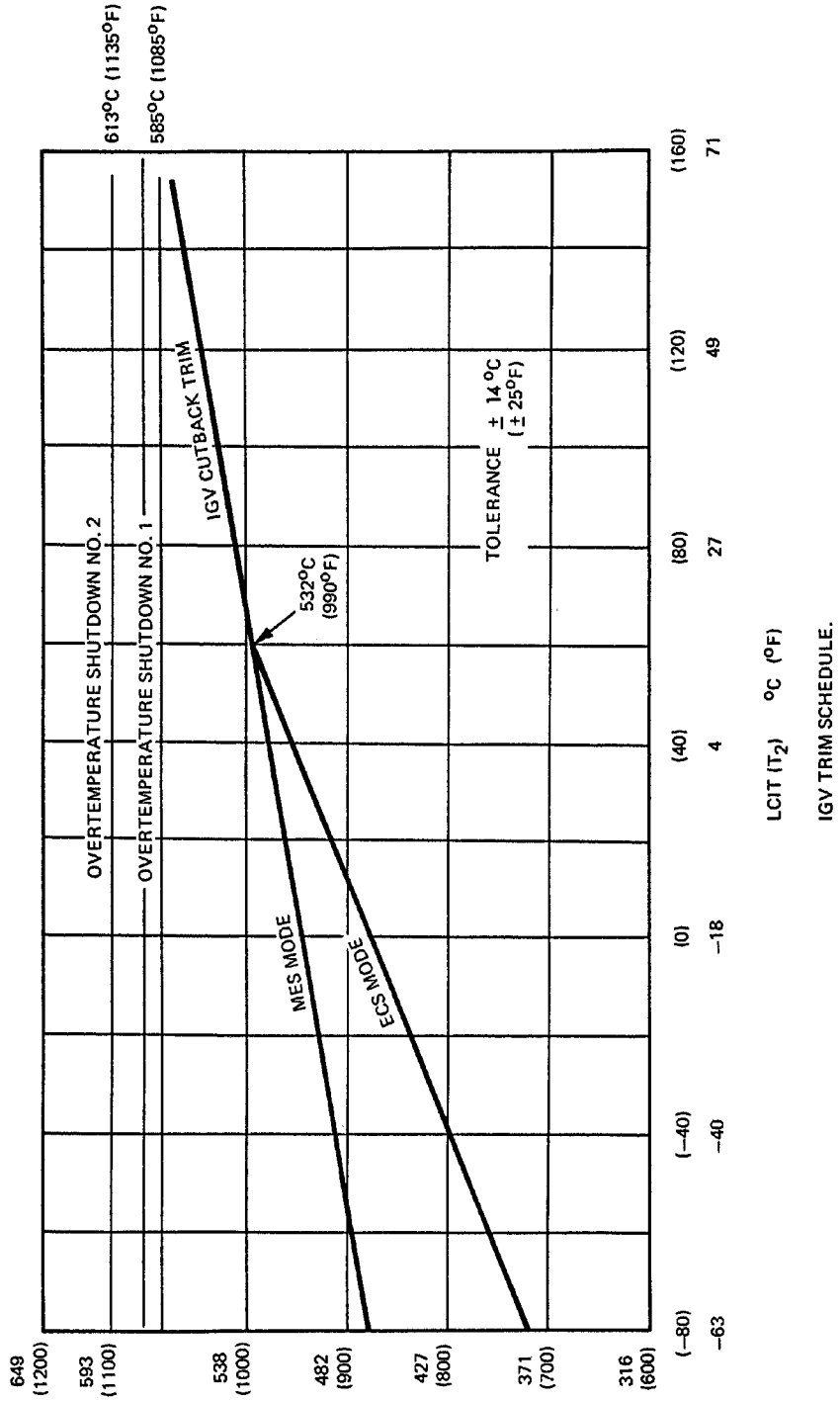
IGV Control Logic
Figure 009



IGV Operation Requirements
Figure 010



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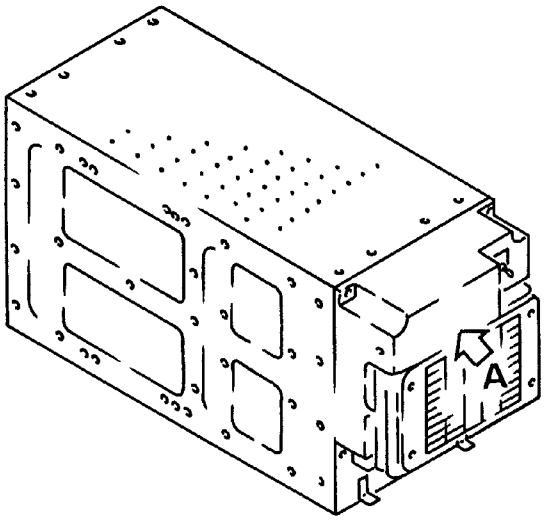
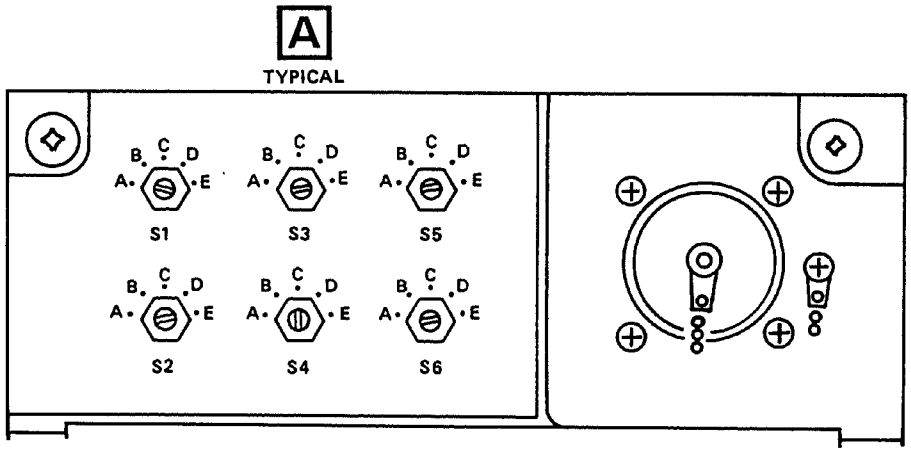
IGV Control
Figure 011





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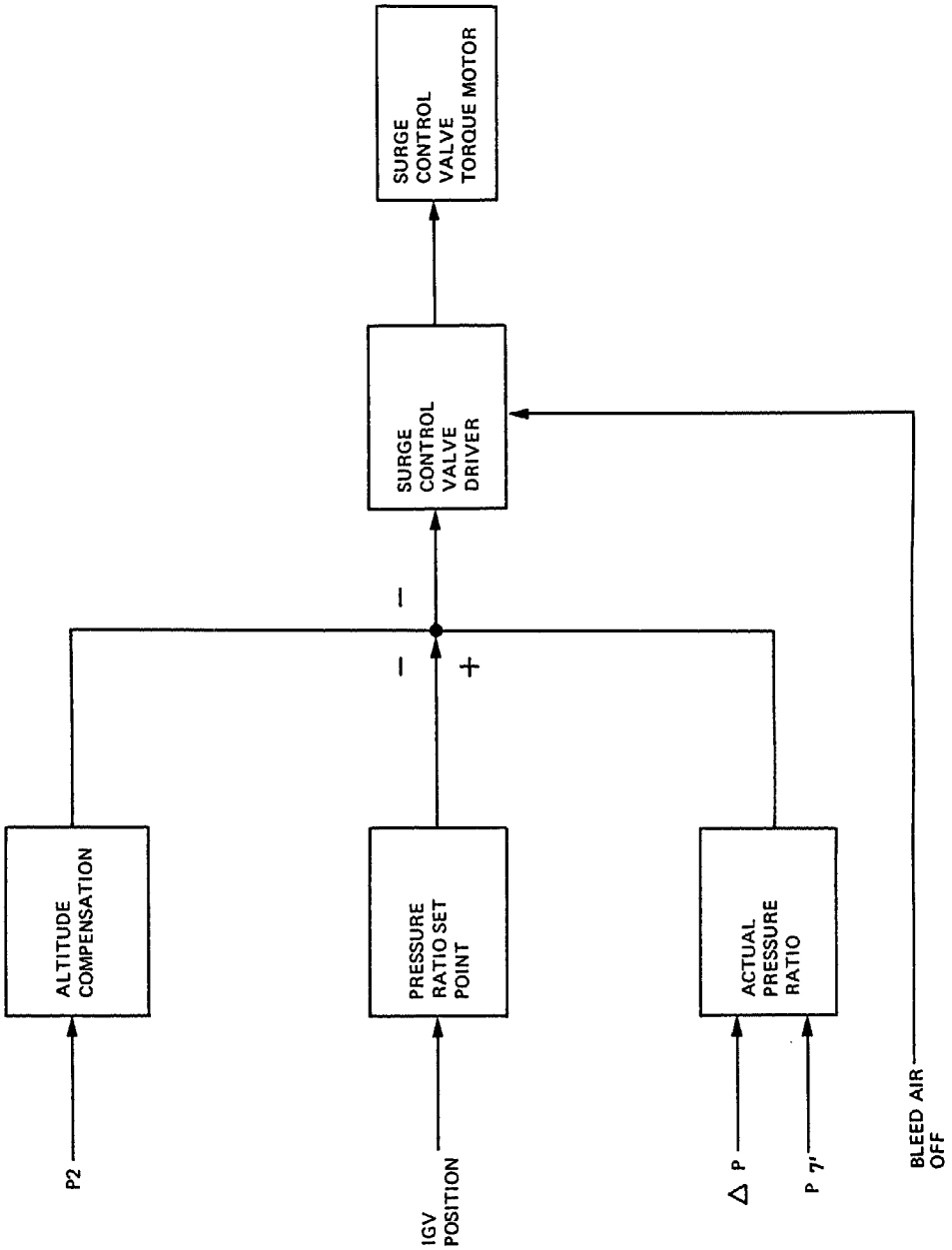
NUMBER	SWITCH NOMENCLATURE	SWITCH POSITION (AS DELIVERED)
S1	ECS MIN ADJ	A
S2	MES ADJ	E
S3	ECS MAX NORM ADJ	E
S4	COOL DOWN TIMER ADJ	C
S5	ECS MAX COLD ADJ	E
S6	EGT TRIM ADJ	E

ECB Front Panel Adjustment Switches
Figure 012



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Surge Control Logic
Figure 013

F. De-oiling Logic

(1)Below 25000 ft:

De-oiling occurs during APU start, depending on the oil temperature (Ref. 49-90-00). The normally closed (N/C) de-oil solenoid is energized either by means of the oil temperature switch in the gearbox and/or the oil HOT sensor via ECB.

In case of de-oiling by means of the oil temperature switch in the gearbox, the (N/C) de-oil solenoid is energized together with the APU starter. In case of de-oiling by means of the oil HOT sensor, the ECB will energize the (N/C) de-oil solenoid up to 60 % RPM.

(2)Above 25000 ft:

De-oil occurs at each start, up to 65 % RPM and is not dependant on oil temperature.

(3)APU shutdown:

The ECB energizes the (N/C) de-oil solenoid between 95 % and 7 % RPM at each APU shutdown.

G. ECB BITE System

(Ref. Fig. 005)

(1)The ECB BITE system provides fault detection, equipment protection, failure information and repair verification. BITE testing is performed by programmed software functions and various hardware circuits and sensors.

If a fault condition exists, the micro-processor stores the fault into the ECB memory and inhibits the APU start, or shuts down the APU.

(2)The ECB performs BITE logic in three modes:

(a)Prestart BITE Mode

The prestart BITE mode is initiated, when APU MASTER SWITCH is ON and START pushbutton switch is pressed.

The APU line replaceable units (LRUs) are tested in approx. 2 seconds for position status (Ref. Table 001). After prestart test, if no protective shutdown circuit is faulty, APU start is initiated.

(b)Monitor BITE Mode

The monitor BITE mode operates automatically and continuously between completion of prestart test and APU shutdown, when APU speed is below 7 % RPM.

For LRUs checked in the monitor mode refer to Table 001.

(c)Self Test Mode

The self test and the prestart BITE mode check the same test functions on the APU LRUs.

The self test is manually initiated by toggle switches on the ECB front panel (Ref. 49-73-00).

(For ECB P/N 2117402-9 and subsequent)

FAILED LRU	ECB INDICATION	PRESTART	MONITOR	SELF TEST
High Oil Temp. Sensor	HOT SENSOR	X	X	X
EGT Sensor	#1 T/C RAKE	X	X	X
	#2 T/C RAKE	X	X	X
Speed Sensor	#1 SPD	X	X	X
	#2 SPD	X	X	X
ECS Demand	ECS CONTRL		X	
IGV Actuator TM	IGV ACT	X		X
FCU TM	FUEL CONTRL	X		X
Fuel Solenoid	FUEL SOL	X		X
Low Oil Pressure Switch	LOP SW	X		
Ignition Unit	IGN UNIT	X	X	X
Fuel Flow Divider	FLOW DVDER	X	X	X
Surge Control Valve TM	SURGE VALVE	X		X
ΔP Transducer	ΔP SENSOR	X	X	X
Total Pressure Transducer	PT SENSOR	X	X	X
LCIT Sensor	LCIT SENSOR	X	X	X
Comp. Inlet Pressure	P2 SENSOR	X	X	X
APU Starter	APU STARTR	X	X	X
Deoil Solenoid Valve	DEOIL SOL	X		X
Starter Contactor	STARTR CKT		X	

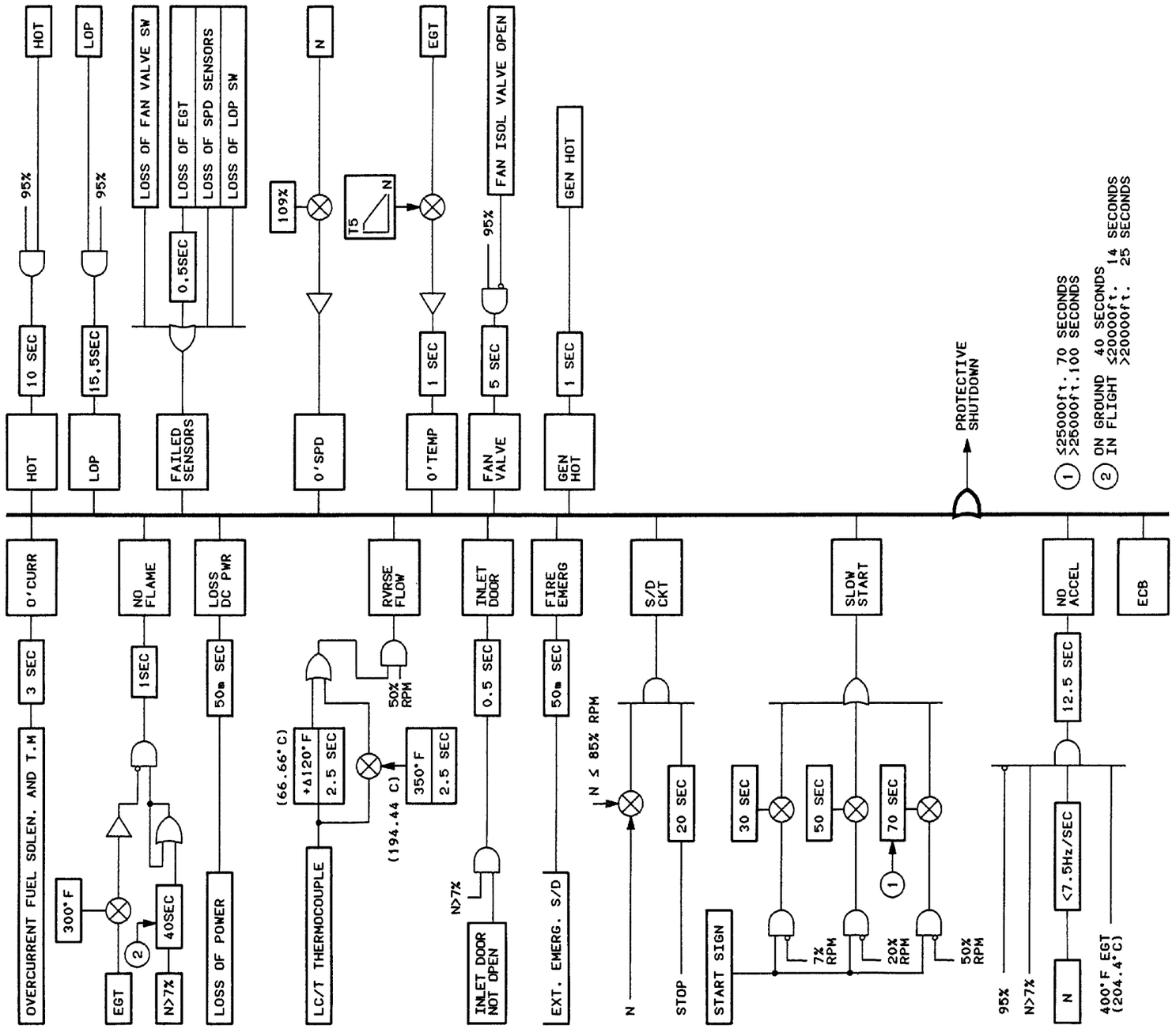
Table 001 (Sheet 1 of 2)

FAILED LRU	ECB INDICATION	PRESTART	MONITOR	SELF TEST
Fan Valve	FAN VALVE	X	X	X
ECB	ECB	X	X	X
Load Contr. Valve Sol.	LD VAL SOL	X	X	X

Table 001 (Sheet 2 of 2)

H. Protective Shutdowns
(Ref. Fig. 014)
(1)The conditions that cause the ECB to automatically shut down the APU are listed below. The first protective shutdown inhibits storing aditional shutdown faults in memory during APU shutdown. Unless otherwise noted, the ECB shuts down the APU by removing power from the loads.
(a)Overspeed (O'SPD)
1 Primary
Primary overspeed protection is provided by analog logic from the 'highest wins' circuit. Shutdown occurs when speed exceeds 107% for 25 milliseconds.
2 Secondary
Back-up overspeed protection is provided by the microprocessor. Overspeed shutdown occurs when speed is greater than 109% for 20 milliseconds.
(b)Overtemperature (O'TEMP)
1 Primary
Primary overtemperature protection is provided by an analog 'highest wins' circuit. Overtemperature shutdown occurs when EGT exceeds the overtemperature schedule for one second.
2 Secondary
Back-up overtemperature protection is provided by the microprocessor.
R The software overtemperature schedule is approximately 50 deg.F (10 deg.C) higher than the analog schedule with a one second time delay.
(c)LOP
APU shutdown occurs if the speed is above 95% and the LOP signal is present for 15.5 seconds.
(d)HOT
APU shutdown occurs if the speed is greater than 95% and oil temperature greater than 310°F (154°C) is sensed for 10 seconds.
(e)No Flame (NO FLAME) (For ECB P/N 2117402-9 and subsequent)
APU shutdown occurs if T5 is less than 300°F (148.9°C) for 1 second and APU speed is more than 7 % RPM for the following conditions:
- on ground 40 seconds
- in flight - up to 20000 ft. 14 seconds
- above 20000 ft. 25 seconds

(f)No Acceleration (NO ACCEL)
APU shutdown will occur if the following logic simultaneously exists:
1 T5 greater than 400°F (204°C).
2 Speed greater than 7 %.
3 Speed less than 95 %.
4 Speed acceleration is less than 75 RPM/second for 12.5 seconds.
(g)Emergency (FIRE EMERG)
If a fire emergency is detected, an APU shutdown occurs, when the fire shutdown signal is grounded for 50 milliseconds (Ref. 49-62-00).
(h)Loss of Sensors (FAILED SENSOR)
Shutdown occurs as a result of one of the following:



Protective Shutdowns (For ECB P/N 2117402-9 and subsequent)
Figure 014

1 Thermocouples (No. 1 T/C RAKE or No. 2 T/C RAKE)
A failed thermocouple appears as a very low temperature. Shutdown occurs if both thermocouple signals are less than -100°F (-73°C) for 50 milliseconds.

2 Speed Sensors (No. 1 SPD SENSOR and No. 2 SPD SENSOR)
The ECB initiates an APU shutdown if only one speed sensor signal exists for 20 milliseconds.

3 LOP Switch
If a failed LOP switch is detected during pre-start test it will cause a failed sensor shutdown.

4 Fan Valve Switch
If a failed fan valve switch is detected during pre-start test it will cause a failed sensor shutdown.

J. Air Intake Flap (INLET DOOR)
APU shutdown occurs if the ECB fails to detect the A/C signal of 'air intake flap open' for 50 milliseconds after speed exceeds 7 % RPM.

K. Reverse Compressor Air Flow (RVRSE FLOW)

R The ECB causes APU shutdown if the LCIT increase exceeds 120 deg.F (48.9 deg.C) for a minimum of 1.1 second in a minimum of 2.5 seconds interval for two times 5 seconds.

R The ECB also shuts down the APU if LCIT increase exceeds 350 deg.F (176.7 deg.C) for a minimum of 0.1 second in 2.5 seconds interval for two times in 7.5 seconds.

L. Start Period Timer (SLOW START)

Shutdown occurs if the APU has not reached:
7 % speed in 30 seconds, 20 % speed in 50 seconds, or 50 % speed in 70 seconds, after completing the pre-start BITE test with the air intake flap open.
For starts carried out above 36,000 ft. with ECB P/N 2117402-11 and subsequent installed the shutdown time limit for 55 % speed is 100 seconds.

M. Clogged Generator Oil Filter (GEN FILTER)

NOTE : On ECB Fault Display/Unit Panel, GEN FILTER and FILTER SW are not shown on ECB P/N 2117402-9 and subsequent.

APU shutdown occurs if the following conditions simultaneously exist:
- MES signal open
- Oil delta P switch is open for 50 milliseconds
- Oil temperature is greater than 115°F (46°C)
- Air-ground signal indicates on ground

N. Shutdown Circuit (S/D CKT)

This shutdown protects the system in the event of an analog overspeed circuit failure. 20 seconds after initiating an overspeed test condition, if speed is greater than 85 %, the ECB shuts down the APU.

P. Loss of DC Power (LOSS DC PWR)

APU shutdown occurs if DC power is interrupted for more than 50 milliseconds.

Q. ECB

Shutdown occurs (or start is inhibited) if any one of the following conditions exist:
- RAM failure
- ROM failure
- A/D failure
- Power supply failure
- Analog speed 'hi-wins' circuit failure
- Fuel control TM driver failed high
- Fuel solenoid driver failed high
- Ignition driver failed high
- SCV TM failed high
- Failed 'keep-alive' circuit
- IGV driver failed high
- Loss of two speed converter circuits (N to DC).

R. Overcurrent (O'CURR)
When an overcurrent condition is detected, the following components are turned off for a period of 1 second and then re-energized for 50 milliseconds:
- fuel solenoid
- fuel torque motor
- de-oil solenoid
- flow divider solenoid
- load valve
- fault relay
- DE-ICE lamp
- fault information relay
- oil fault relay
- 7 percent relay
- 60 percent relay
- hourmeter
- generator load or A/C relay.

The appliances are latched off, if after 3 seconds the overcurrent still exists.
An overcurrent shutdown will occur if excess current is detected in the fuel solenoid or fuel control TM loads after 3 seconds. Other overcurrents will be detected but only the driver will be turned off.

S. Generator High Oil Temperature (GEN HOT)
APU shutdown occurs if the high oil temperature signal is present for 1 second.

T. Failed LRUs (For ECB P/N 2117402-9 and subsequent)
The ECB monitors selected APU LRU failures by examining certain parameters for abnormal conditions. For protection, some failed LRUs will cause the ECB to inhibit an APU start (Ref. Fig. 014).
LRU faults:
- Loss of LCIT sensor
- Loss of EGT sensor No. 1
- Loss of EGT sensor No. 2
- Loss of speed sensor No. 1
- Loss of speed sensor No. 2
- ECS controller
- LOP switch closed
- Fuel control TM
- IGV actuator (TM and LVDT)
- Fuel solenoid
- Ignition unit
- Start motor
- A/C start circuit
- Fuel flow divider solenoid
- ECB
- SCV TM
- De-oiling solenoid
- HOT sensor
- Delta P transducer
- PT transducer
- P2 transducer
- Fan valve switch
- Load valve solenoid.

Alternate Values for Failed LRUs
The ECB programs alternate values for certain failed LRUs detected in prestart BITE or during APU operation.
The LRU's are:
- P2 Sensor
- ΔP Sensor
- PT Sensor
- LCIT Sensor
- LVDT Sensor
- HOT Sensor
- ECS Signal
- ECB

During the time delay between LRU failure and programming of the alternate value, the ECB uses the last value detected before failure. The alternate value is programmed for the duration of the run.

**ON A/C ALL

4. Operation
(Ref. Fig. 015)

A. APU Operation
(1)APU start (Ref. 49-40-00)
(2)Governed speed control
(a)ECS
On AIR BLEED panel 436VU, the APU BLEED switch 17HV is placed to ON position and on COMPT TEMP panel 437VU, the PACK VALVE 1 191HB and/or PACK VALVE 2 189HB pushbutton switches are in line, transfers the ECS demand signal to the ECB to control the APU speed to 40142 RPM (100 %) (Ref. 21-11-00, 21-61-00).
(b)MES
On ENG START panel 429VU pressing engine START 1 (6KG) or START 2 (7KG) pushbutton transfers MES demand signal to the Electronic Control Box (ECB) to increase APU speed to 40,712 RPM (101.4 %) and thus obtain the required bleed airflow (Ref. 71-00-00).
(c)De-ice
On ANTI ICE panel 426VU, pressing WING SUPPLY pushbutton transfers a de-ice demand signal to the ECB to increase APU speed to 41,142 RPM (102.5 %) and thus obtain the required bleed airflow (Ref. 30-11-00).

B. Normal Shutdown
(1)APU MASTER SW 14KD is placed to OFF position.
(a)If bleed air is used:
- IGVs are closed
- APU bleed load valve is closed
- Surge control valve opens
- APU cooldown timer operates for 60 seconds.

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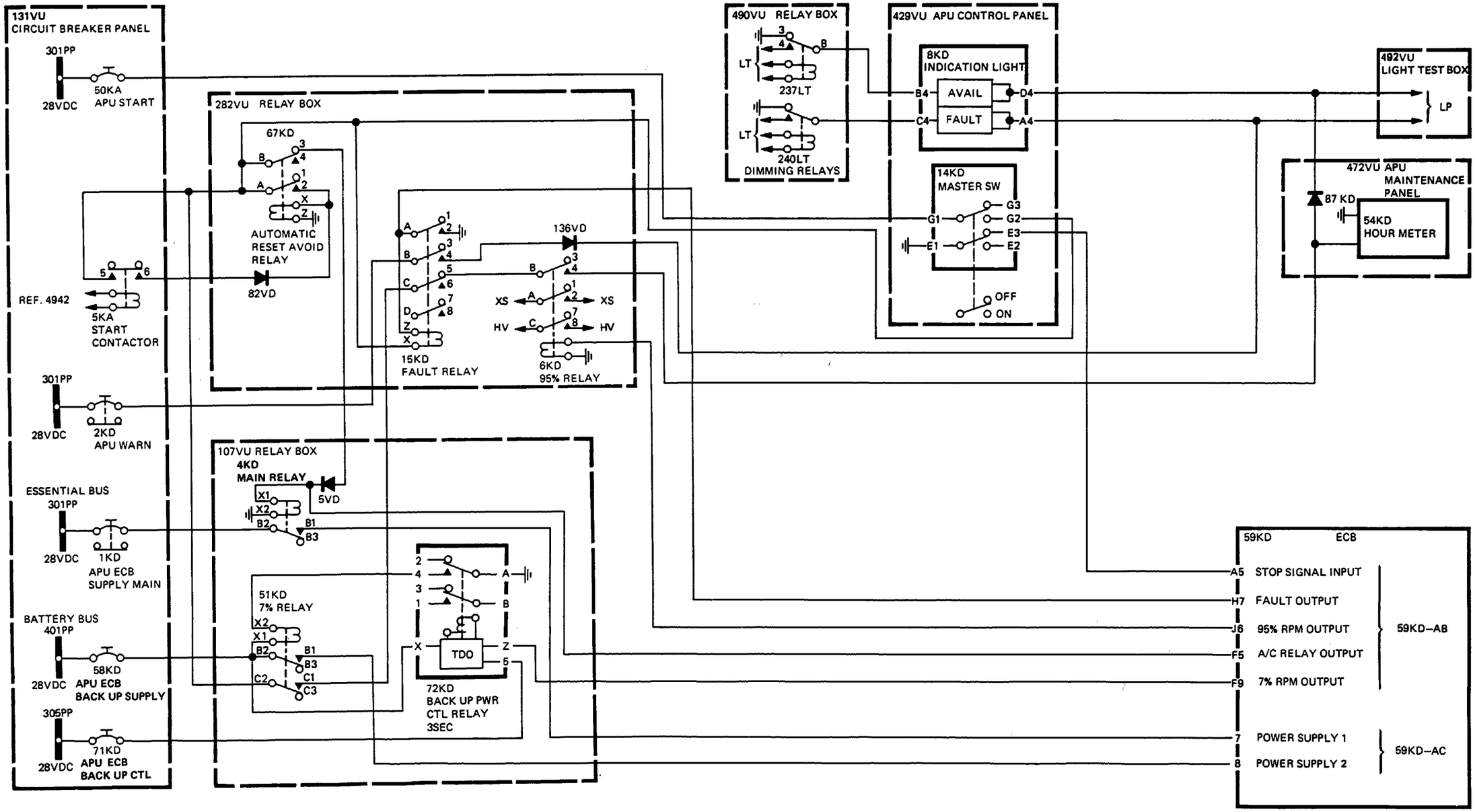

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ECB - Supply
Figure 015

(b)Normal shutdown
- Analog overtemperature test is initiated for 1.5 seconds.
- After 2 sec., overspeed 109 % RPM is simulated and APU shuts down
- 95 % relay is de-energized
- Main relay is de-energized
- Fuel solenoid valve is closed
- APU LP fuel pump is off
- Fuel isolation valve 11QF is closed (SHUT legend comes on)
- 7 % relay de-energizes
- ECB de-energizes
- EGT/RPM indication is de-energized after 60 seconds.

C. Protective Shutdown
- The ECB receives a signal from the faulty unit and shuts down the APU
- IGVs are closed
- Surge control valve opens
- 95 % relay is de-energized
- Main relay is de-energized
- Fuel solenoid valve is closed
- APU LP fuel pump is off
- Fuel isolation valve 11QF is closed (SHUT legend) comes on
- 7 % relay de-energizes
- ECB de-energizes
- EGT/RPM Indication is de-energized after 60 seconds.
- Fault relay is off
- ECB BITE DISPLAY MFA 52KD comes on (Ref. 33-17-00)
- On L ECAM display unit the following message appears:
  APU
  APU FAULT: AUTO SHUT DOWN
  - MASTER SW: .....OFF
- On Main Instrument panel, MASTER CAUTION light comes on
- Single chime sounds
- FAULT legend 8KD comes on
- Protective shutdown reasons are stored in the memory of the ECB (Ref. 49-73-00).
- Place APU MASTER SW 14KD to OFF position.

ELECTRONIC CONTROL BOX (59KD) - REMOVAL/INSTALLATION

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

WARNING : IGNITION SYSTEM IS ENERGIZED DURING ELECTRONIC CONTROL BOX SELF TEST (BITE TEST).

CAUTION : DO NOT TOUCH PINS OF CONNECTOR ON ELECTRONIC CONTROL BOX AND SOCKET ON ELECTRONIC CONTROL BOX RACK.

R WARNING : BEFORE YOU DO A SELF-TEST OF THE ECB, MAKE SURE THAT THERE IS NO
R OTHER MAINTENANCE TASK ON THE APU AT THE SAME TIME.
R DURING THE SELF-TEST, THE ECB WILL CAUSE THE IGNITION PLUG TO FIRE
R A NUMBER OF TIMES.

1. Reason for the Job

A. Replacement of defective Electronic Control Box (ECB)

B. Removal of ECB rack

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 2.3 m (7.5 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 49-73-00, P. Block 1	Analyzers
- 49-00-00, P. Block 1	Trouble Shooting Manual (TSM)

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	AIR BLEED AND COMPT TEMP/DEMAND TEMP CTL	7HH	F56
132VU	ANTI ICE/APU BOOST SIGNAL	54DM	N64
133VU	ENGINES/ENG 1 AND 2 START CTL AND WARN	1KG	R68

(2)Between FR72 and FR73A, LH, open lateral stowage compartment.
(Ref. Fig. 401)
(Ref. Fig. 402)

B. Removal
(1)Removal of ECB
CAUTION : TO SAVE BITE INFORMATION DO NOT ERASE MEMORY BEFORE ECB REMOVAL.
(a)Take readings from ECB (Ref. 49-73-00, P. Block 1) and record for subsequent trouble shooting.
(b)At ECB rack (1) loosen two extractors/hold downs by turning the fluted knobs (2) to the left.
(c)Extract ECB (3) from socket (4).

CAUTION : WEIGHT OF ECB IS 8.4 kg (18.5 lb).

(d)Remove ECB (3) from rack (1).
(2)Removal of ECB Rack and Support
(a)Remove bolt (6) and washer (7) and disconnect bonding strap (5) from ECB rack (1).
(b)Remove bolts (8, 9), washers (10), spacer (11) and nuts (12).
(c)Remove bracket (13) from ECB rack (1).
(d)Remove screws (14) and remove socket (4) from ECB rack (1).
(e)Remove screws (15) and remove ECB rack (1) from support (16).
(f)At lateral stowage compartment partition remove bolts (17) and washers (18).
(g)Remove bolts (19) and washers (18).
(h)Remove support (16) from lateral stowage compartment.

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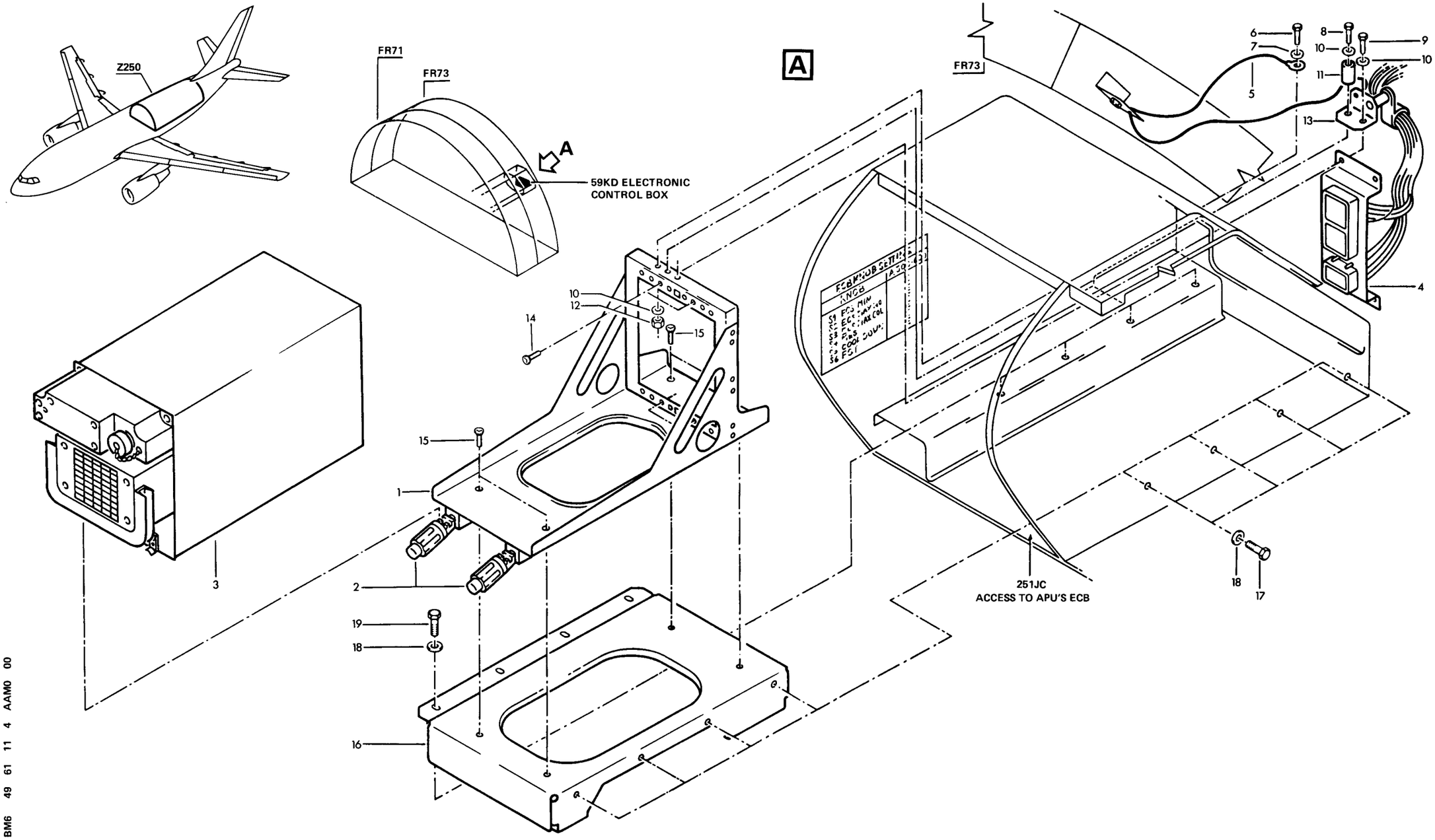

Electronic Control Box
Figure 401

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R

R EFFECTIVITY: ALL

PIA

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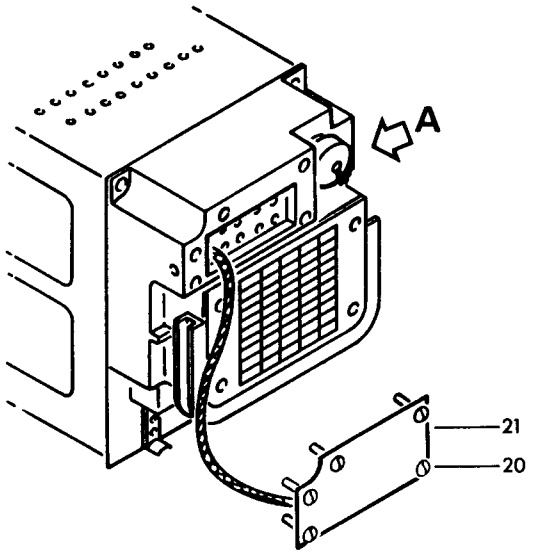
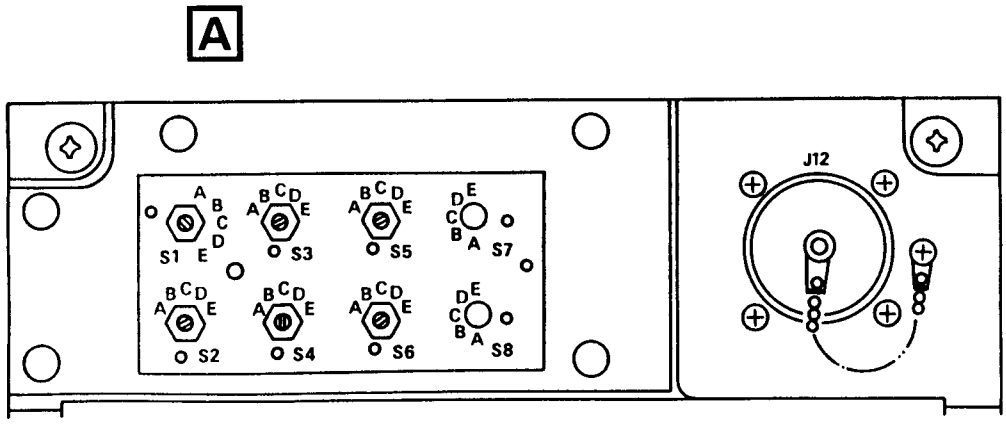
ECB KNOB SETTING		
KNOB		A310
S1	ECS MIN	A
S2	MES	E
S3	ECS MAX NORM	E
S4	COOL DOWN	C
S5	ECS MAX COLD	E
S6	EGT	E





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ECB ECS Knob Settings
Figure 402

R

C. Installation

(1)Installation of ECB Rack and Support

(a)Position support (16) and install with bolts (17, 19) and washers (18).

(b)Position ECB rack (1) and install on support (16) with screws (15).

(c)Install socket (4) to ECB rack (1) with screws (14).

(d)Position bracket (13) and install to ECB rack (1) with bolts (8, 9), spacer (11), washers (10) and nuts (12).

(e)Install bonding strap (5) to ECB rack (1) with bolt (6) and washer (7).

(2)Installation of ECB

CAUTION: WEIGHT OF ECB IS 8.4 kg (18.5 lb.).

(a)Position ECB (3) in ECB rack (1).

CAUTION: CAREFULLY CONNECT ECB TO SOCKET ON ECB RACK TO AVOID DAMAGING PINS.

(b)Connect ECB (3) to socket (4).

(c)Insert extractors/hold downs and turn fluted knobs (2) to the right until red marking is fully covered.

(3)Check/Adjustment of ECB Knob Setting

(a)Remove screws (20).

(b)Remove ECB knob cover (21).

(c)Make certain that ECB ECS knobs S1 thru S6 are adjusted in accordance with set points.

ECB KNOB SETTING

KNOB	DESIGNATION	SET POINTS
S1	Environmental Control System Minimum	A
S3	Environmental Control System Maximum Normal	E
S5	Environmental Control System Maximum Cold	E
S2	Main Engine Start	E
S4	Cool Down	C
S6	Exhaust Gas Temperature	E

(d)Position ECB knob cover (21).

(e)Install screws (20).

D. Test

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job Set-Up

(a)On APU panel 429 VU: Make certain, that APU MASTER switch 14KD is in OFF position.

(b)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(d)Remove safety clips and tags and close circuit breakers 54DM, 7HH, 50KA, 1KD, 2KD, 58KD, 71KD and 1KG.

(2)ECB Self Test (BITE TEST)

ACTION	RESULT
1. On ECB 59KD switch panel: - Set MEMORY ERASE toggle switch to upper position for min. 5 seconds.	On ECB 59KD FAULT UNIT matrix: - Wait display element comes on for approx. 20 seconds. - TST OK display element comes on for 4 seconds.
2. On ECB 59KD switch panel: - Set TEST toggle switch to LAMP position for min. 5 seconds.	On ECB 59KD FAULT DISPLAY matrix and FAULT UNIT matrix: - Each columm of display elements comes on for 4 seconds. One column at a time from the left to the right.
3. On ECB 59KD switch panel: - Set TEST toggle switch to SELF position for min. 5 seconds.	On ECB 59KD FAULT UNIT matrix: - WAIT display element comes on for approx. 2 seconds. - TST OK display element comes on for 4 seconds, if self test was successful. - If self test was unsuccessful, relevant display elements come on for 4 seconds each. One display element at a time, from top to bottom and left to right.

NOTE: Carry out troubleshooting (Ref. TSM 49-00-00) before ECB memory is erased, if self test was unsuccessful.

4. On ECB 59KD switch panel: - Set MEMORY ERASE toggle switch to upper position for min. 5 seconds.	On ECB 59KD FAULT UNIT matrix: - WAIT display element comes on for approx. 20 seconds. - TST OK display comes on for 4 seconds.

E. Close-Up
(1)Close lateral stowage compartment between FR72 and FR73A on LH side.
(2)De-energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

HOURMETER (54KD) - REMOVAL/INSTALLATION

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips and Tags
B.	Electrical Ground Power Unit - 3-Phase, 115/200V, 400Hz
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- ESPM 20-43-13	Crimp End Splices

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	AIR BLEED AND COMPT TEMP/DEMAND TEMP CTL	7HH	F56
132VU	ANTI ICE/APU BOOST SIGNAL	54DM	N64
133VU	ENGINES/ENG 1 AND 2 START CTL AND WARN	1KG	R68

(2)Open APU maintenance panel 472VU.

(Ref. Fig. 401)

B. Removal

(1)Disconnect wires (1) (Ref. ESPM 20-43-13).
(2)Remove the two screws (3), the two washers (4) and the two nuts (5).
(3)Remove hourmeter (2).

C. Installation

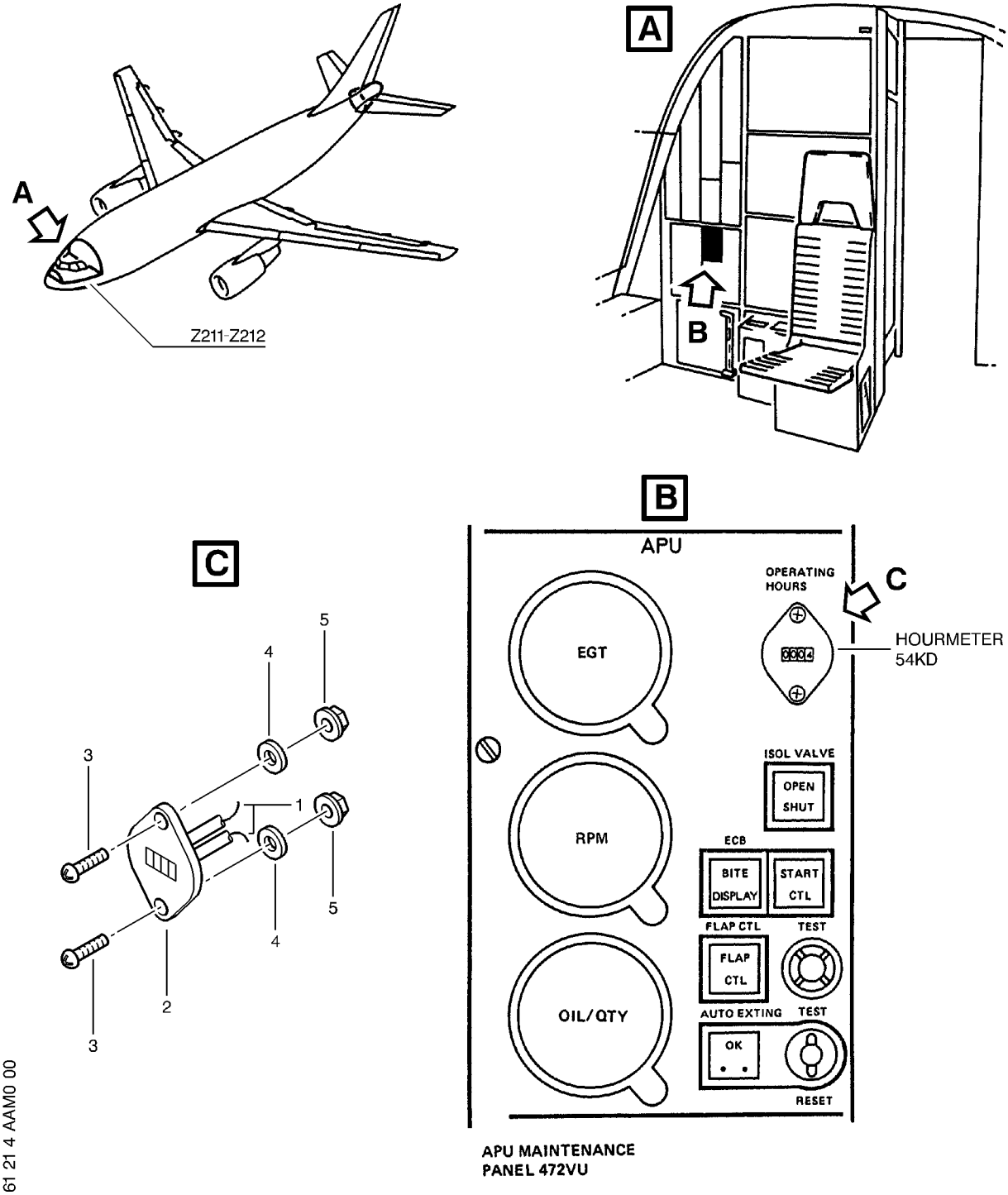
(1)Install hourmeter (2) with the two screws (3), the two washers (4) and the two nuts (5).
(2)Connect wires (1) (Ref. ESPM 20-43-13).

D. Test

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job set-up

(a)On APU panel 429VU :



APU MAINTENANCE PANEL 472VU

Hourmeter (54KD) - Removal/Installation
Figure 401

- Make certain that APU MASTER switch 14KD is in OFF position.

(b)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(d)Remove safety clips and tags and close circuit breakers : 54DM, 7HH, 50KA, 1KD, 2KD, 58KD, 71KD and 1KG.

(2)Hourmeter (54KD) test

	ACTION	RESULT
R	On APU panel 429VU :	On APU maintenance panel 472VU :
R	- Place APU MASTER switch 14KD	- EGT/RPM indication is armed.
R	in ON position.	
R	- Press START pushbutton switch	When APU RPM exceeds 95 % :
R	2KA to latched position.	- The hourmeter (54KD) value
R		increases by one unit after
R		one hour.
R		

E. Close-Up

(1)Close the APU maintenance panel 472VU.

(2)De-energize aircraft electrical network (Ref. 24-41-00, P.Block 301).

START COUNTER (73KD) - REMOVAL/INSTALLATION

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips and Tags
B.	Electrical Ground Power Unit - 3-Phase, 115/200V, 400Hz
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- ESPM 20-43-13	Crimp End Splices

2. Procedure

A. Job Set-Up

(1)Open, safety and tag following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/WARN	2KD	B56
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	AIR BLEED AND COMPT TEMP/DEMAND TEMP CTL	7HH	F56
132VU	ANTI ICE/APU BOOST SIGNAL	54DM	N64
133VU	ENGINES/ENG 1 AND 2 START CTL AND WARN	1KG	R68

(2)Open APU maintenance panel 472VU.

(Ref. Fig. 401)

B. Removal

(1)Disconnect wires (1) (Ref. ESPM 20-43-13).
(2)Remove the two screws (3), the two washers (4) and the two nuts (5).
(3)Remove start counter (2).

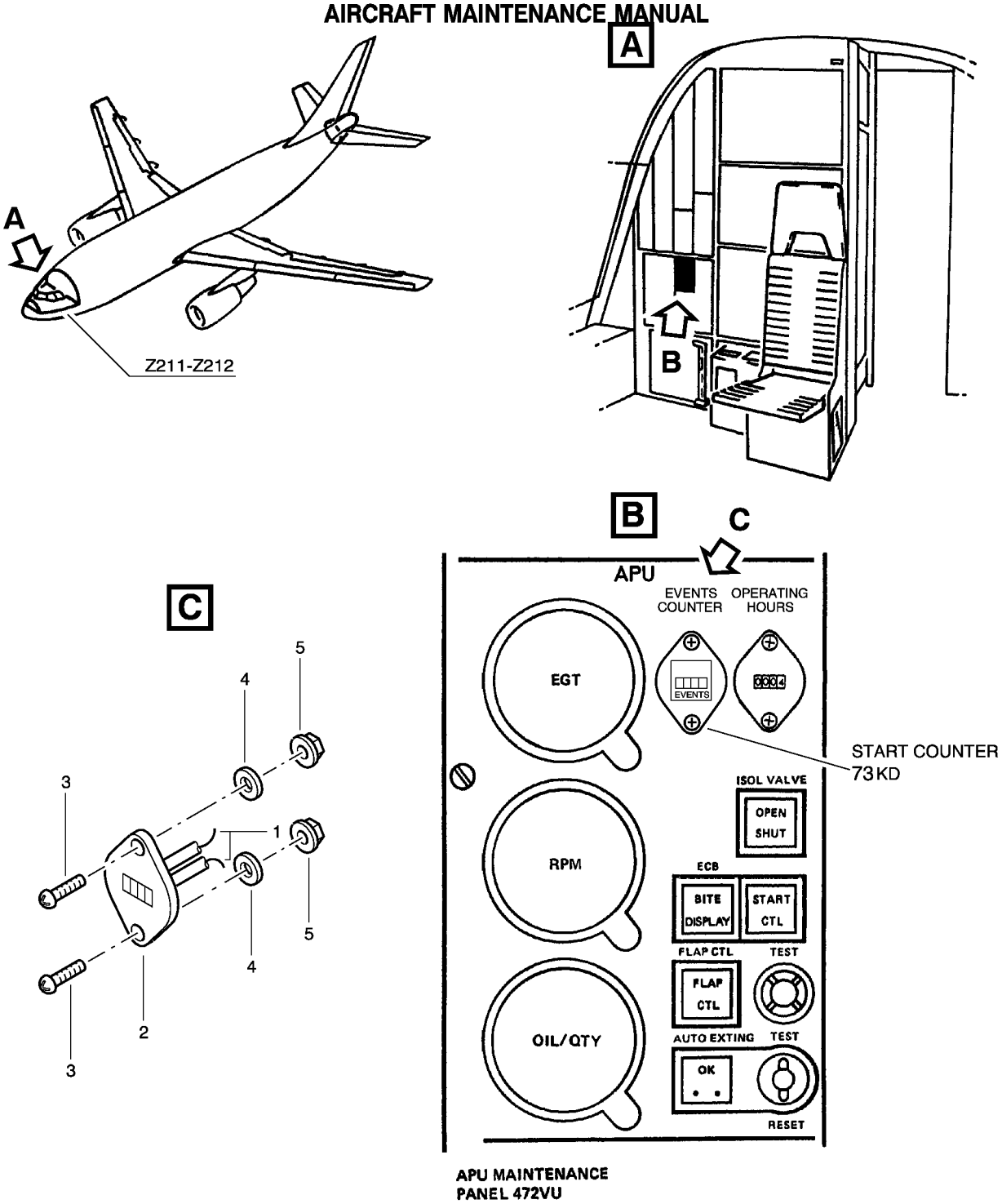
C. Installation

(1)Install start counter (2) with the two screws (3), the two washers (4) and the two nuts (5).
(2)Connect wires (1) (Ref. ESPM 20-43-13).

D. Test

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job set-up



APU MAINTENANCE
PANEL 472VU

Start Counter (73KD) - Removal/Installation
Figure 401

(a)On APU panel 429VU :
- Make certain that APU MASTER switch 14KD is in OFF position.

(b)Connect electrical ground power unit and energize aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(d)Remove safety clips and tags and close circuit breakers 54DM, 7HH, 50KA, 1KD, 2KD, 58KD, 71KD and 1KG.

(2)Start counter (73KD) test

ACTION	RESULT
On APU panel 429VU : - Put APU MASTER switch 14KD in ON position.	On APU maintenance panel 472VU : - EGT/RPM indication is armed.
- Press START pushbutton switch 2KA to latched position.	When APU RPM exceeds 95 % : - Start counter (73KD) value increases by one unit after one hour.

E. Close-Up

(1)Close the APU maintenance panel 472VU.

(2)De-energize aircraft electrical network (Ref. 24-41-00, P.Block 301).

APU EMERGENCY SHUTDOWN - DESCRIPTION AND OPERATION

1. General

In addition to normal shutdown, the APU is protected by an automatic shutdown system which responds to certain system malfunctions and to an emergency switch signal conditioner which processes manual external shutdown switch signals or automatic fire detection shutdown signals. An emergency shutdown of the APU occurs when a ground signal is transmitted to the Electronic Control Box (ECB) emergency shutdown input.

2. Component Location

(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11
1KL	APU EMERGENCY SHUTDOWN SWITCH	110VU	144		
14KD	SWITCH-APU MASTER	429VU	210		
3WC	BOX-INTERPHONE		711		23-42-12
4WC	HORN-EXTERNAL		120		23-42-21
20WG	APU FIRE CONTROL MODULE	20VU	210		26-13-20

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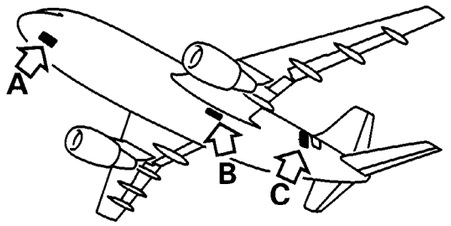
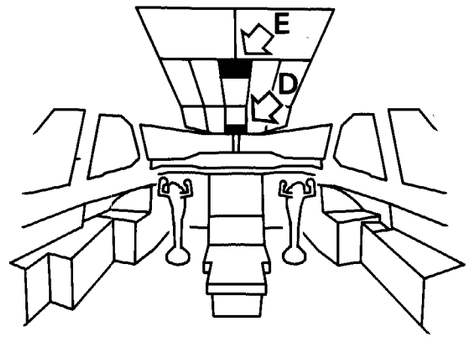
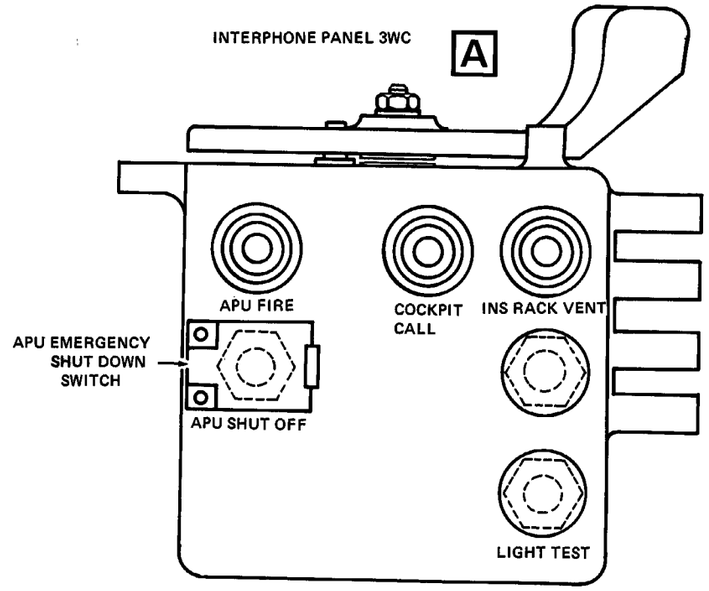
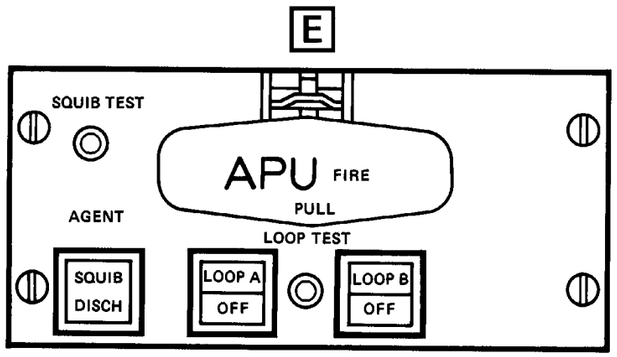
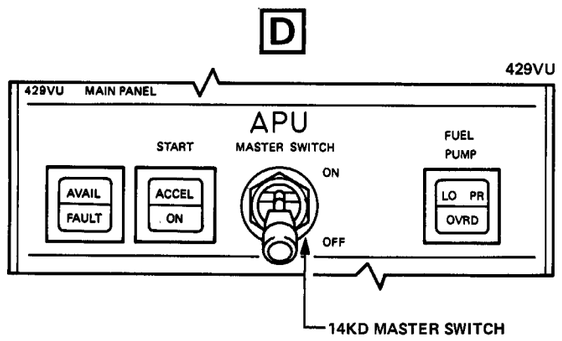


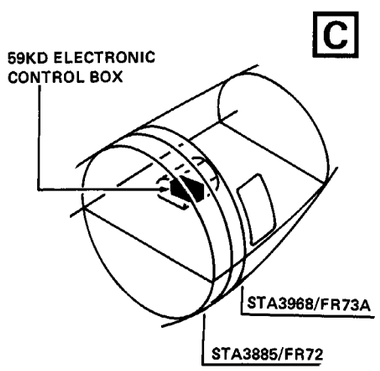


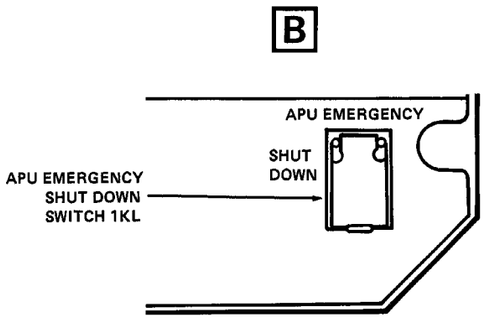




APU FIRE CONTROL MODULE 20WG







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Emergency Shutdown
Figure 001

3. Description

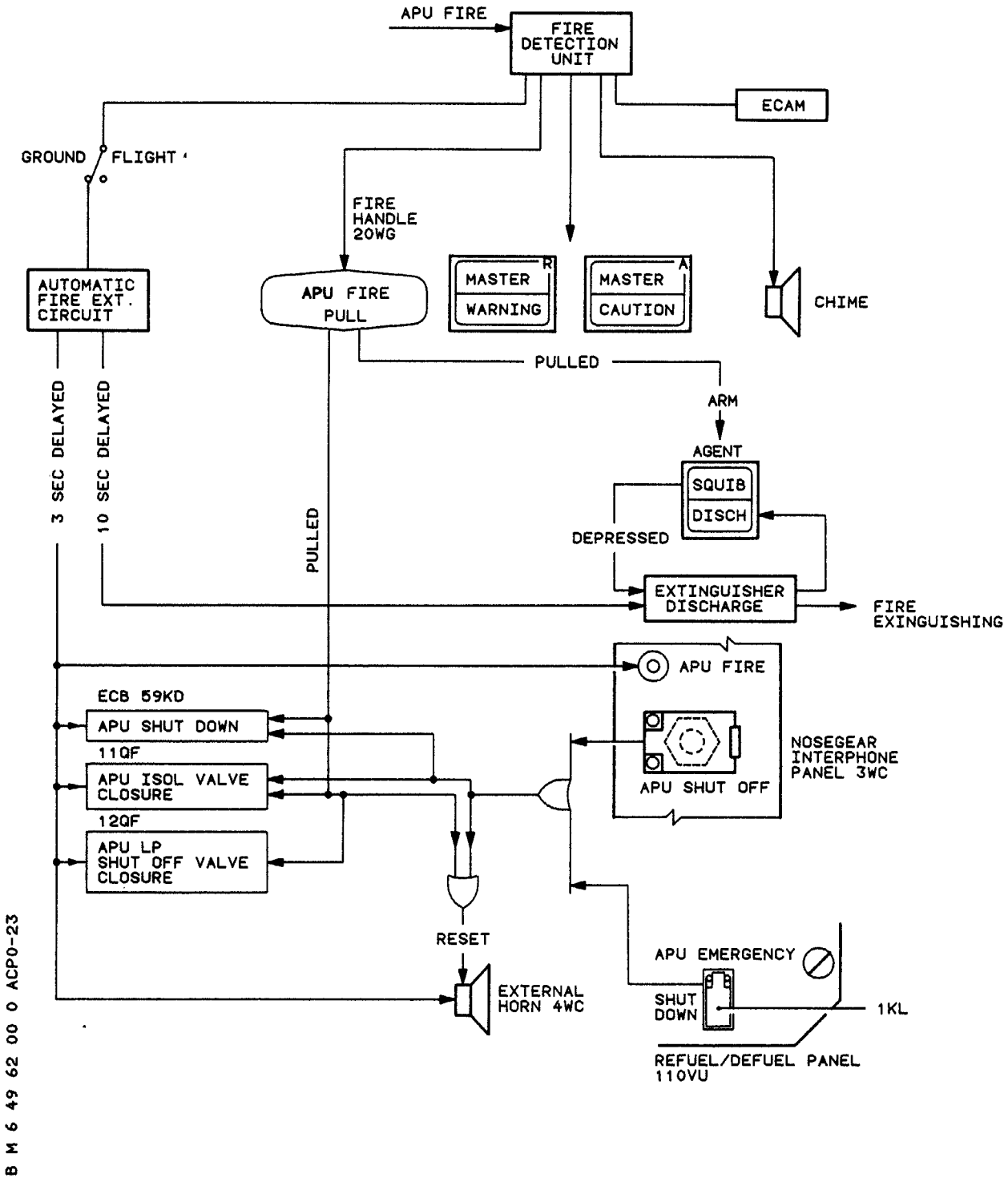
A. In the event of fire or emergency conditions, an APU shutdown is initiated from any of the following sources:
- The APU FIRE PULL Handle, on APU fire control module 20WG.
- The APU SHUTOFF Switch, on interphone box 3WC.
- The APU automatic fire extinguishing system on ground (Ref. 26-22-00).
- The APU EMERGENCY SHUTDOWN switch, 1KL.

B. APU FIRE PULL Handle
The APU FIRE PULL handle on APU fire control module 20WG is located on the overhead panel in flight compartment. It is a pull switch with T-grip and is used, during flight or on the ground to initiate an APU shutdown if a fire warning is indicated.

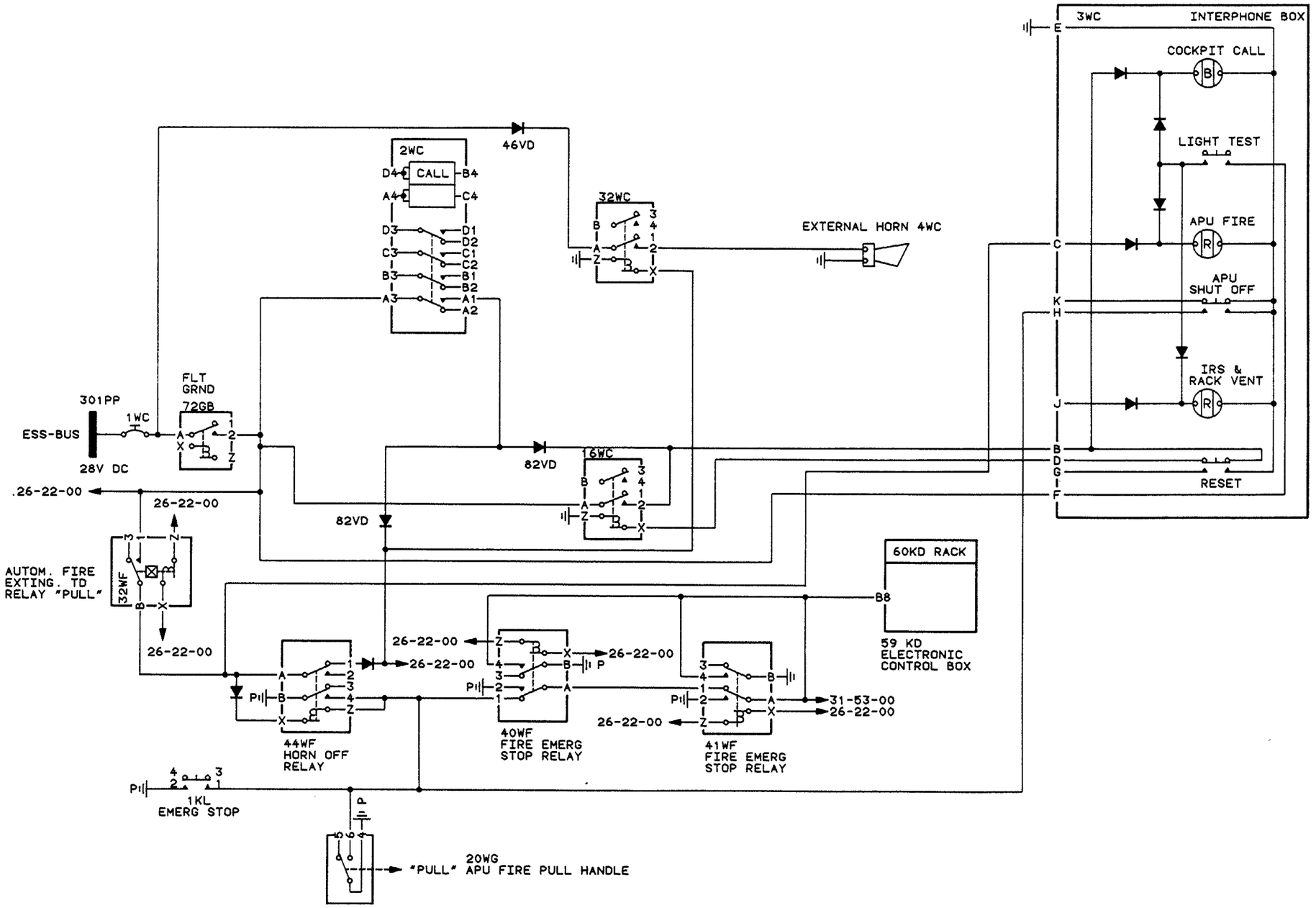
C. APU SHUTOFF Switch
The APU SHUTOFF switch is located in the ground service interphone panel 3WC, located on the nose gear and is protected by a spring loaded cover. In case of emergency condition the switch is used by the ground crew to confirm APU shutdown and to stop the aural warning (external horn 4WC).

D. APU EMERGENCY SHUTDOWN Switch 1KL:
- The pushbutton switch APU EMERGENCY SHUTDOWN 1KL, on the refuel/defuel panel 110VU, is protected by a spring-loaded cover, and provides an APU emergency shutdown facility on the outside of the aircraft.

(Ref. Fig. 002)
(Ref. Fig. 003)



APU Emergency Shutdown - Block Diagram
Figure 002



B M 6 49 62 00 0 AEM0-23

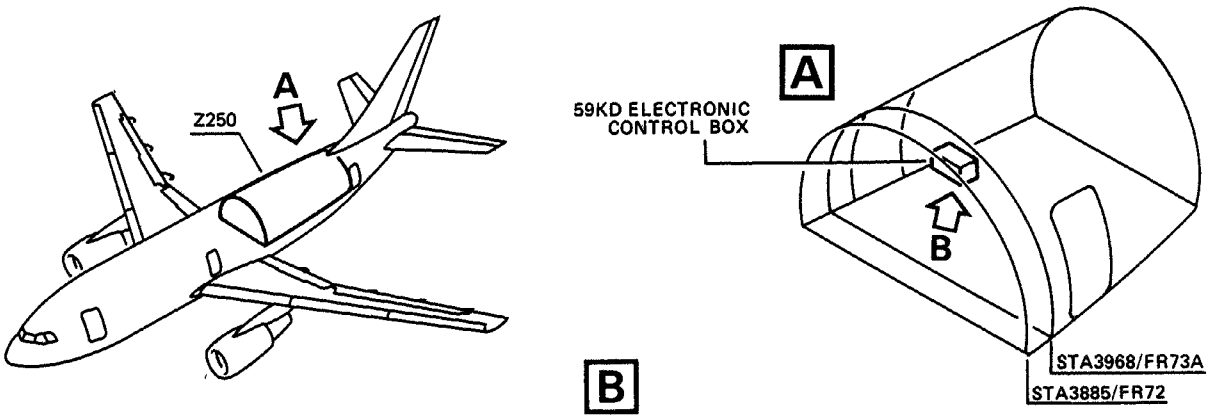
APU Emergency Shutdown - Principal Diagram
Figure 003

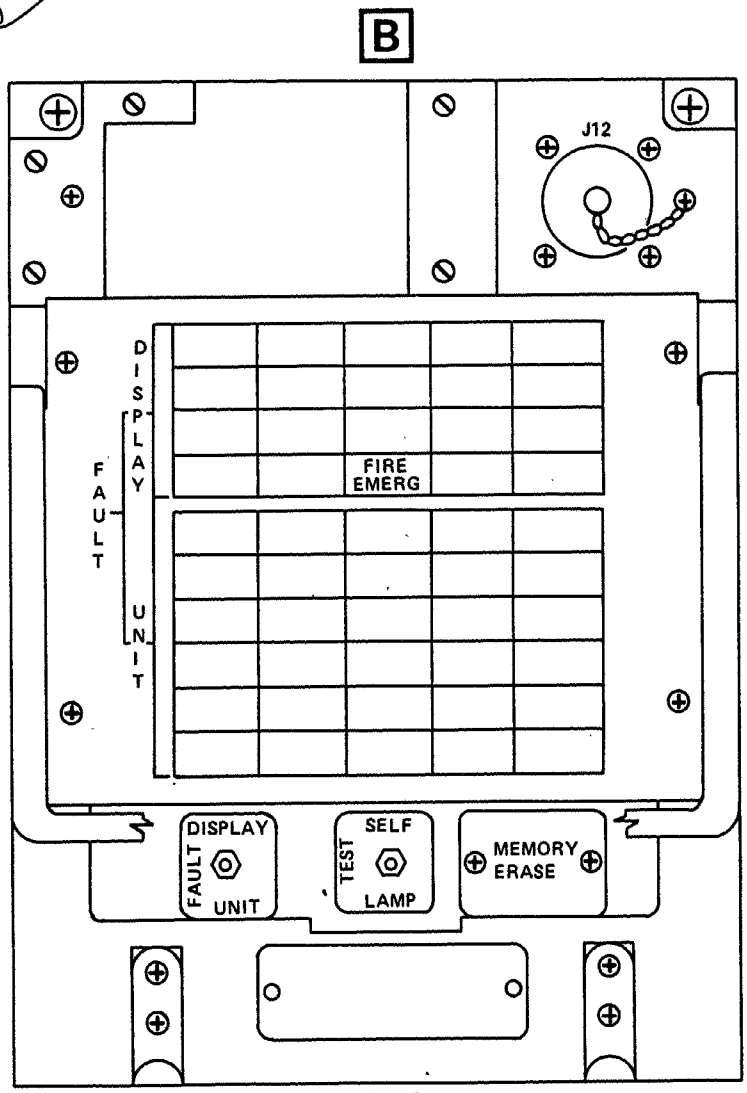
4. Operation
(Ref. Fig. 004)

A. When the ground signal to initiate a shutdown is activated by:
- The APU FIRE PULL handle;
- The APU SHUTOFF switch on interphone box 3WC;
- The APU EMERGENCY SHUTDOWN switch 1KL;
- The automatic fire extinguishing system on ground (Ref. 26-22-00).

An emergency shutdown signal is passed to the ECB 59KD and the ECB shuts down the APU by de-energizing the solenoids and torque motors.

B. The following actions occur simultaneously:
- Fuel solenoid valve closes;
- Fuel isolation valve 11QF closes;
- Fuel pump 8QC is de-energized;
- External horn 4WG goes off;
- On ECB front panel, FIRE EMERG display element comes on (Ref. 49-73-00);
- ECB-BITE-DISPLAY MFA light comes on;
- FAULT indicator light 8KA comes on;
- On L ECAM display unit the following message appears:
  APU
  APU FAULT : EMER SHUTDOWN
  - MASTER SW .....OFF
- MASTER CAUTION lights come on.
- the APU LP fire shutoff valve 12QF closes, if emergency shutdown is initiated either by the automatic fire extinguishing system on ground, or by the APU FIRE PULL handle.





ECB FRONT PANEL
POSSIBLE FAULT ILLUMINATION
FOR EMERGENCY SHUT DOWN

B M 6 49 62 00 0 AG M 0-24

APU Emergency Shutdown - ECB Display
Figure 004

APU EMERGENCY SHUTDOWN - ADJUSTMENT/TEST

1. Operational Test of APU Emergency Shutdown System

A. Referenced Procedures

- 49-00-00, P. Block 501 Airborne Auxiliary Power

B. Procedure

(1)Test

ACTION	RESULT
1. Start and operate APU with no load (Ref. 49-00-00, P. Block 501)	
2. On ground service interphone box 3WC: - Press APU SHUT OFF switch.	 - APU shuts down.
3. On APU panel 429VU: - Place MASTER SW switch 14KD to OFF position.	- On maintenance panel 472VU: - MFA ECB/BITE DISPLAY 52KD - comes on.
4. Carry out ECB (59KD) Test: (Ref. 49-00-00, P. Block 501).	- On ECB 59KD: - display element FIRE EMERG comes on.

NOTE : If APU does not shutdown immediately, put MASTER SWITCH 14KD to OFF position and carry out troubleshooting procedures.

1. General

A. The APU indicating system consists of the following indicators:
(1)RPM indicator 50KN indicates APU engine speeds in percent. It is supplied via the master switch and a 60 sec. time-delay relay (Ref. 49-71-00).
(2)The EGT indicator 2KP indicates APU exhaust gas temperature in degrees C. It is supplied via the master switch and a 60 sec. time-delay relay (Ref. 49-72-00).
(3)The OIL LEVEL indicator 50KK indicates the APU oil level in static and dynamic mode (Ref. 49-93-00).

R **ON A/C 001-100,

(4)The hourmeter 54KD indicates the total operation hours of the APU. It is supplied when the APU RPM exceeds 95 % (Ref. 49-73-00).

R **ON A/C 101-200,

(4)The hourmeter 54KD indicates the total operation hours of the APU. The start cycle counter 73KD (EVENT COUNTER) records the number of APU starts. They are supplied when the APU RPM exceeds 95 % (Ref. 49-73-00).

R **ON A/C ALL

B. The fault isolation procedures are based on an Electronic Control Box (ECB) with a Built-In Test Equipment (BITE) system (Ref. 49-73-00).

C. Additionally, the APU operating parameters are provided via ECAM on the system and warning display (Ref. 31-51-00).

D. Specific APU operating parameters, such as ECB-BITE DISPLAY, START CTL and FLAP CTL are stored by memorized fault annunciators (M.F.A.'s) (Ref. 33-17-00).

R **ON A/C 001-100,

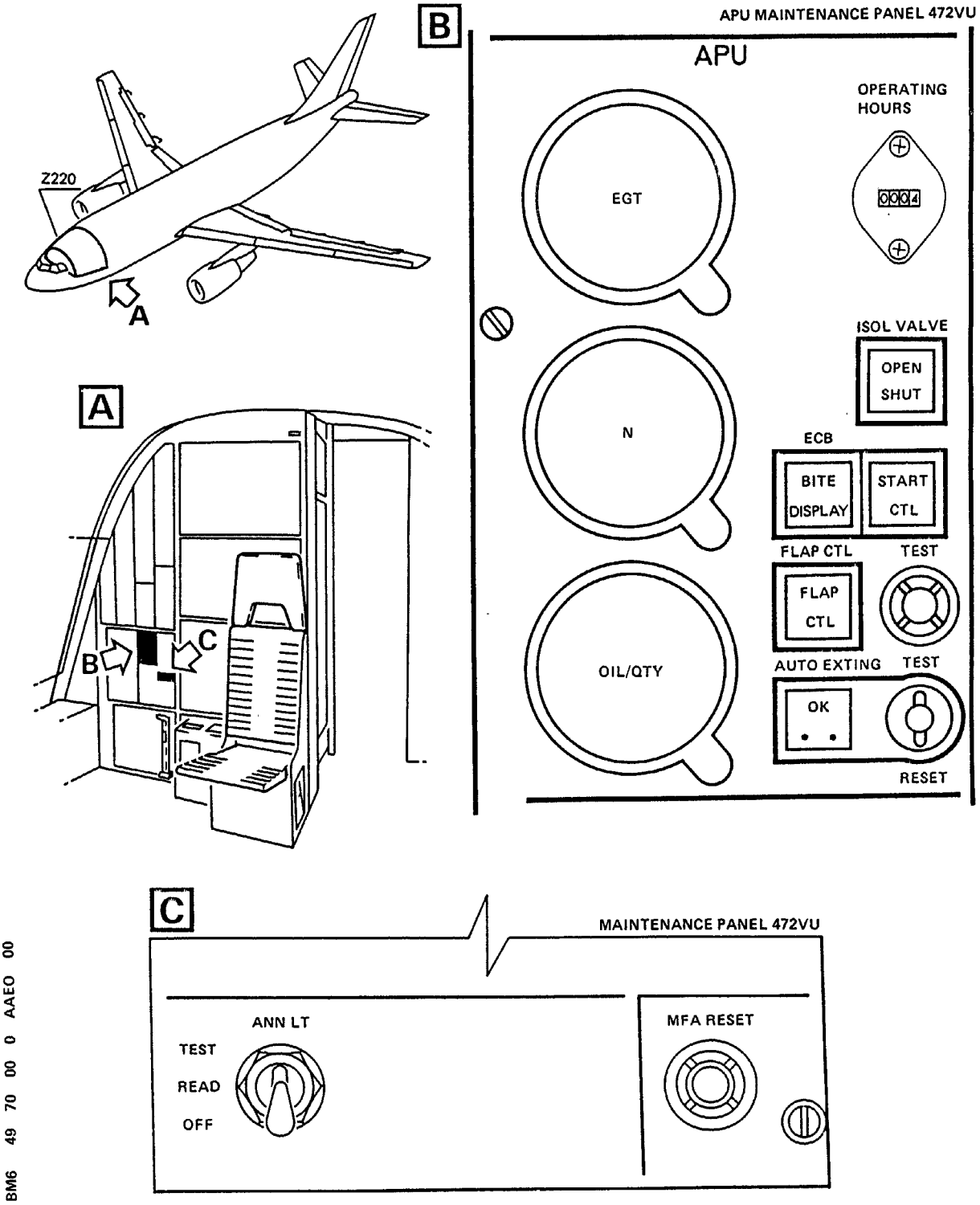
(Ref. Fig. 001)

R **ON A/C 101-200,

(Ref. Fig. 002)

R **ON A/C ALL

(Ref. Fig. 003)



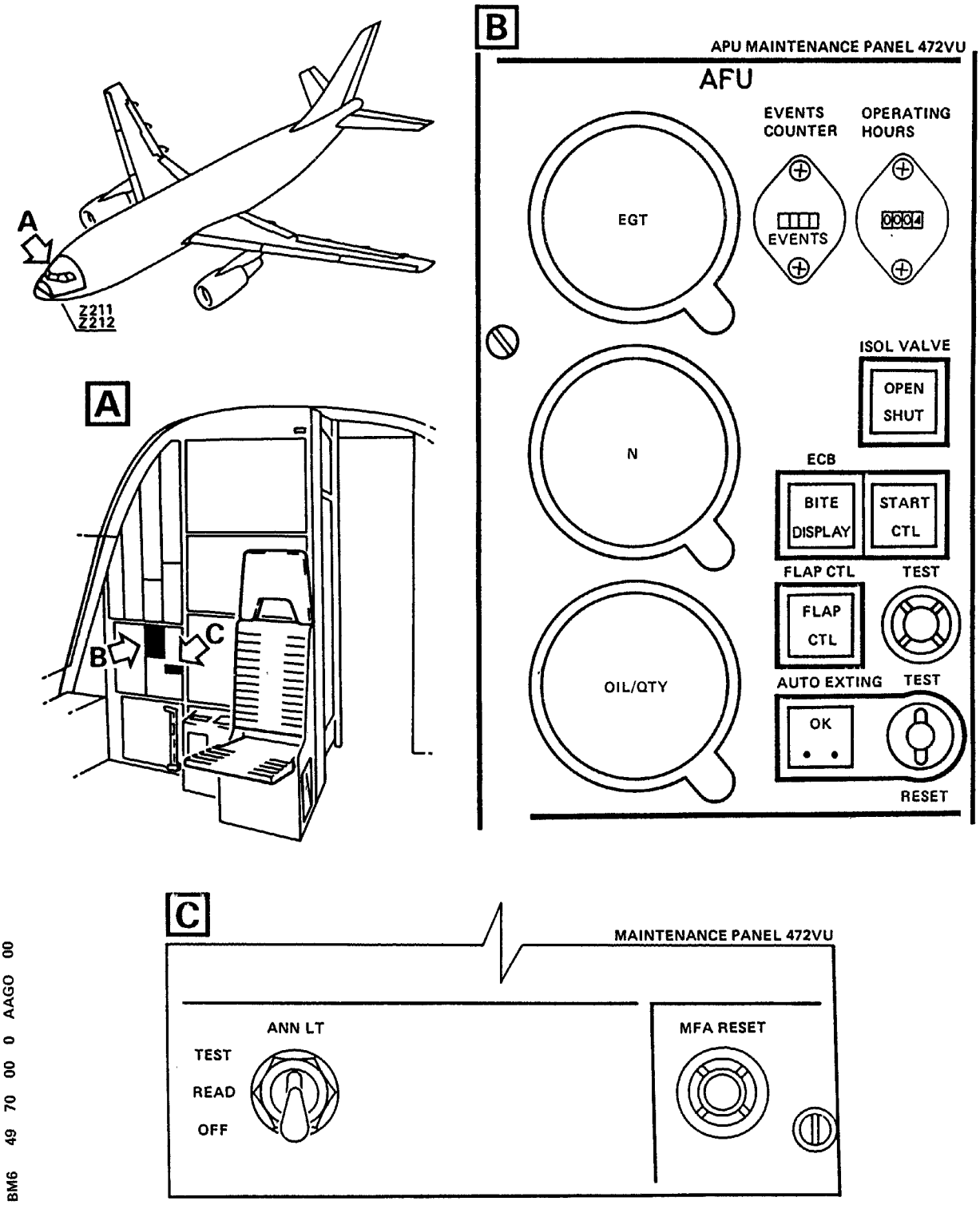
BM6 49 70 00 0 AAEO 00

Indicating
Figure 001

R EFFECTIVITY: 001-100,

PIA

Printed in France



BM6 49 70 00 0 AAGO 00

Indicating
Figure 002

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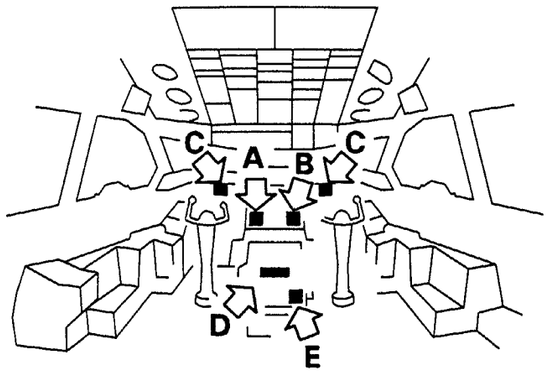

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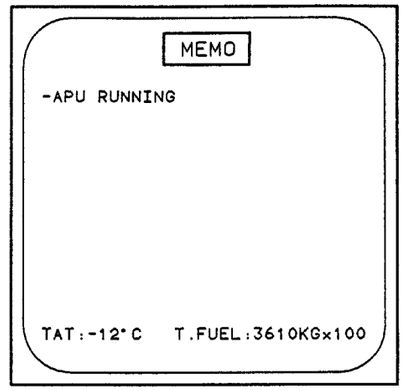
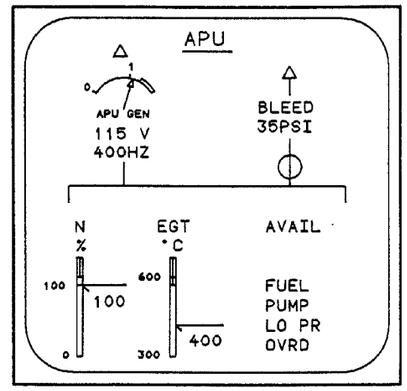


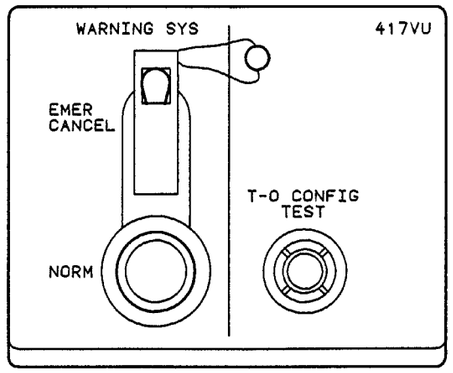
L ECAM DISPLAY UNIT

B



R ECAM DISPLAY UNIT

E



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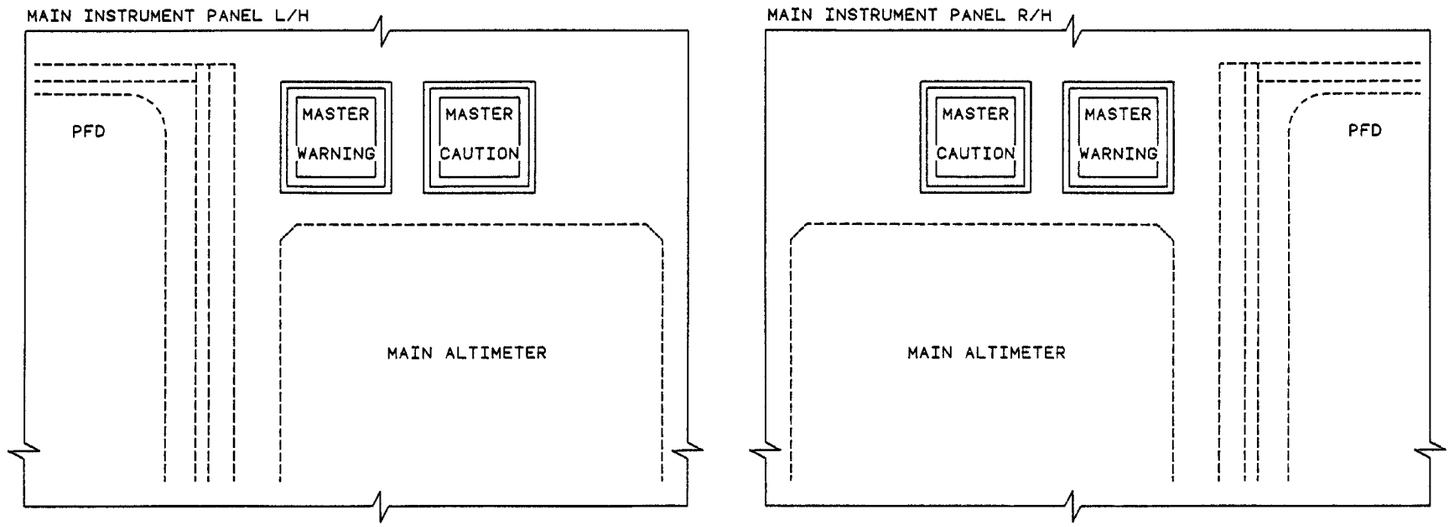

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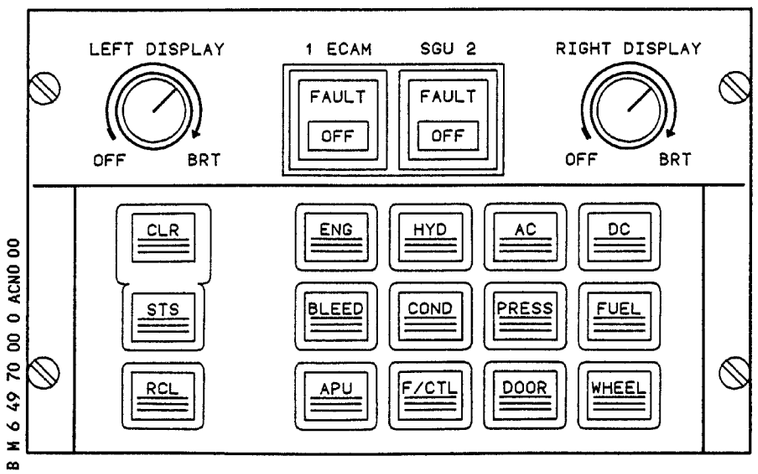

ECAM - Location
Figure 003

2. ECAM System and Warning Display
(Ref. Fig. 004)

A. The electronic centralized aircraft monitoring (ECAM) system provides the crew with operational assistance for normal and abnormal aircraft system configuration.
The ECAM system consists of:
- 2 CRT (Cathode Ray Tube)
- MASTER WARNING and MASTER CAUTION lights
- ECAM control panel
- Loudspeakers
- NORM CANCEL pushbutton switch
- EMERG CANCEL switch

B. Warning Display (L ECAM Display Unit)
The L ECAM display unit presents one of the following modes:
- Warning mode
As soon as a warning is detected the L ECAM shows the warning first page. The warning messages are written under their system title. The warning message is cleared either, if the failure disappears, or manually by depressing the CLEAR pushbutton switch.
- STATUS mode
The STATUS message gives the list of the operational status of the aircraft.
This mode is selected:
. Automatically after a warning message, as soon as all corrective actions have been completed.
. Manually by depressing STS pushbutton switch.
- MEMO mode
This mode is the basic page of the L ECAM display unit. It reminds that any of the systems or functions are used temporarily.
For the APU system the following messages are possible:
Warnings (Ref. Fig. 005)
- STATUS
. APU INOP
- MEMO
. APU RUNNING

C. System Display (R ECAM Display Unit)
(Ref. Fig. 006)

The R ECAM display unit presents one of the system schematics.
- Normal Mode
This mode is possible when no other mode is engaged. The R ECAM shows automatically the most appropriate system page.
- Manual Mode
This mode can be engaged at any time, but is automatically disengaged by engagement of advisory mode or failure. The R ECAM display unit shows the system page selected on ECAM panel.

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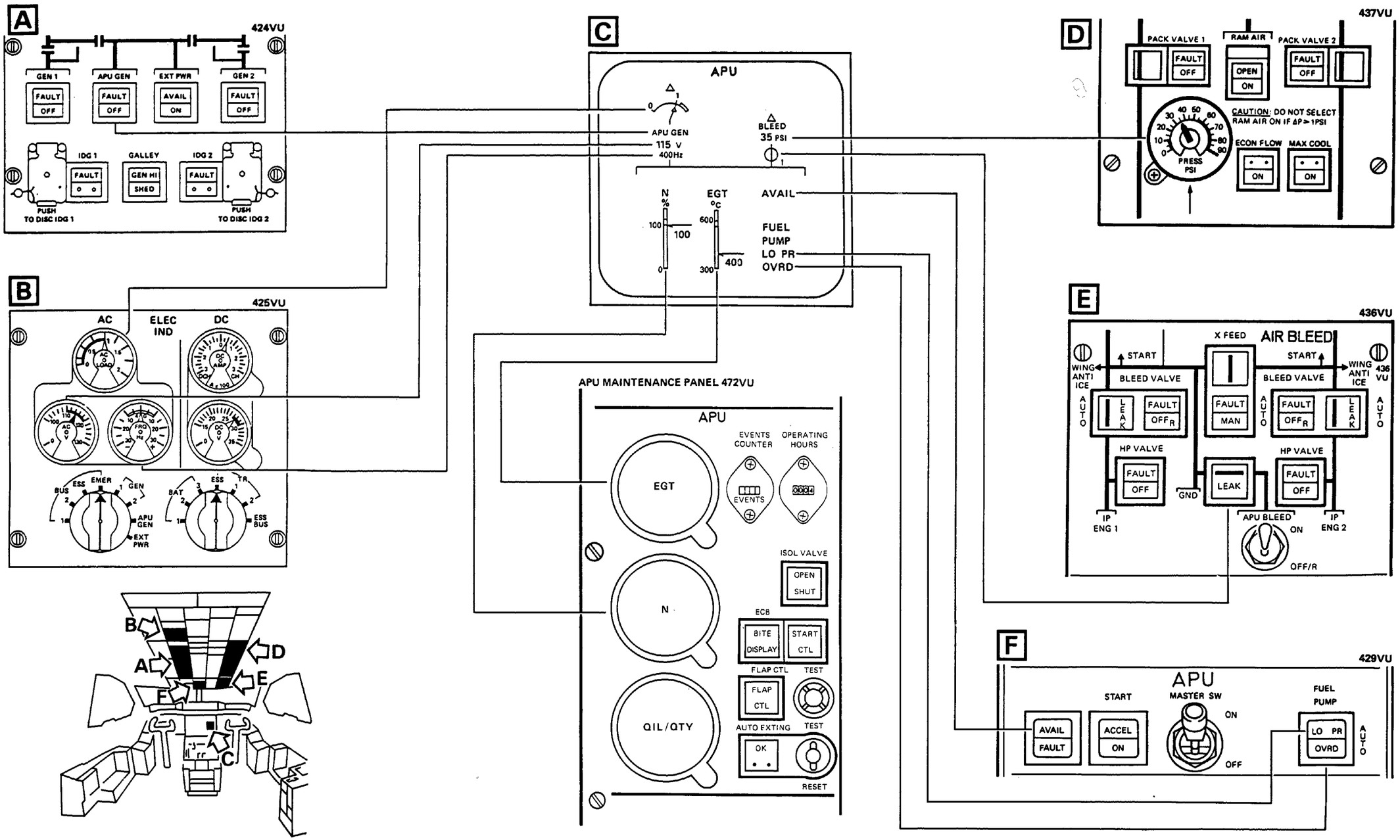
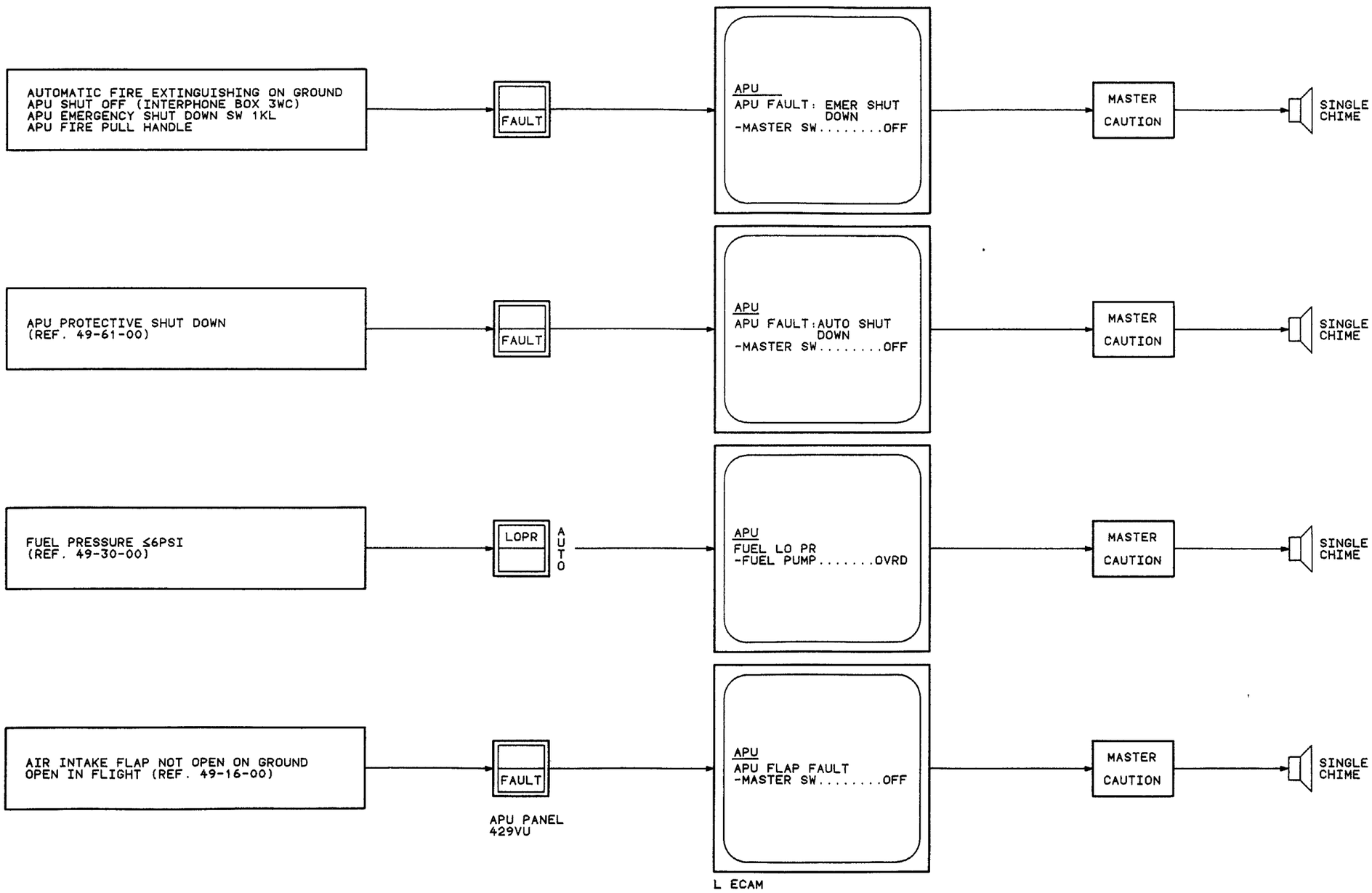


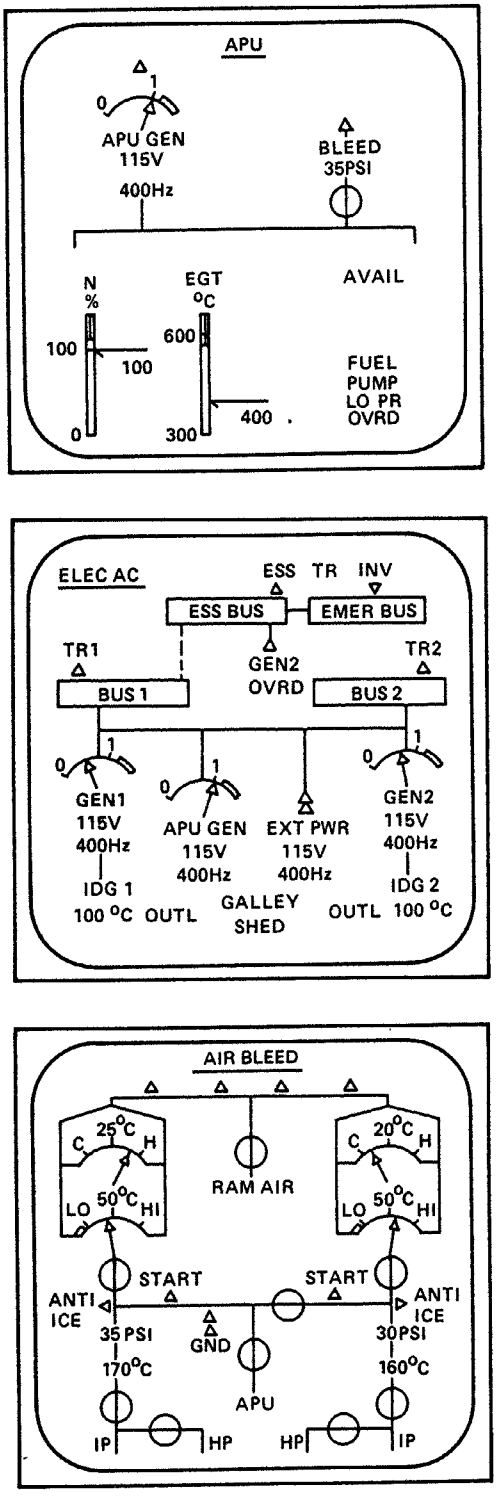
BM6 49 70 00 0 AENO 00

APU ECAM System
Figure 004



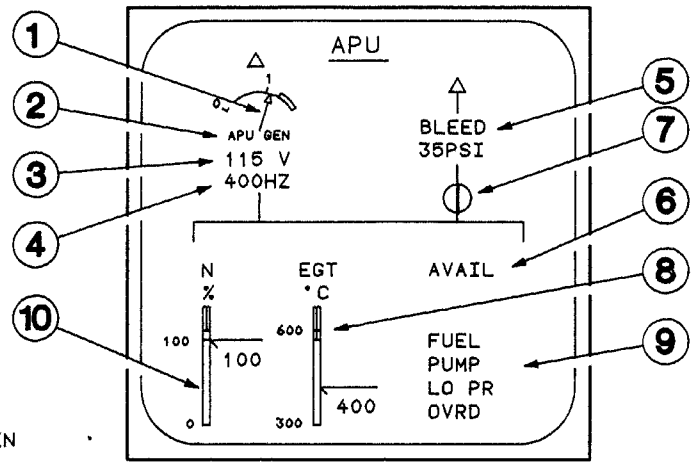
B M 6 49 70 00 0 AFN0-25

ECAM Warnings
Figure 005



B M 6 49 70 00 D AH M A-25

ECAM System Page
(Sheet 1/2)
Figure 006



(1) APU GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110%
Δ(W) REPLACES LOAD INDICATION WHEN APU MASTER SW IS IN OFF POSITION

(2) APU GEN (W)
(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND APU MASTER SW IS IN ON POSITION

(3) APU GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

(4) APU GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION OR APU GEN P/B SWITCH IS SELECTED OFF/R

(5) APU BLEED PRESSURE (G)
(A) WHEN PRESSURE ≥ 57PSI
NOT DISPLAYED WHEN BLEED VALVE CLOSED

(6) AVAIL (NOT DISPLAYED)
AVAIL(G) WHEN N ≥ 95% AND APU MASTER SW IS IN ON POSITION

(7) APU BLEED VALVE
⊕ (G) : VALVE OPEN
⊖ (G) : VALVE CLOSED

(8) APU EXHAUST GAS TEMERATURE (G)
(A) WHEN EGT ≥ 585°C FLASHES WHEN EGT ≥ 540°C

(9) FUEL PUMP (W) WHEN LO PR OR OVRD
LO PR (A) WHEN FUEL LOW PRESSURE DETECTED
OVRD (G) WHEN FUEL PUMP SW IS SELECTED OVRD
NOT DISPLAYED IN NORMAL OPERATION

NOTE: (G) GREEN
(A) AMBER
(W) WHITE

(10) APU RPM (G)
(A) WHEN N ≥ 107%

B M 6 49 70 00 0 AHMM-25

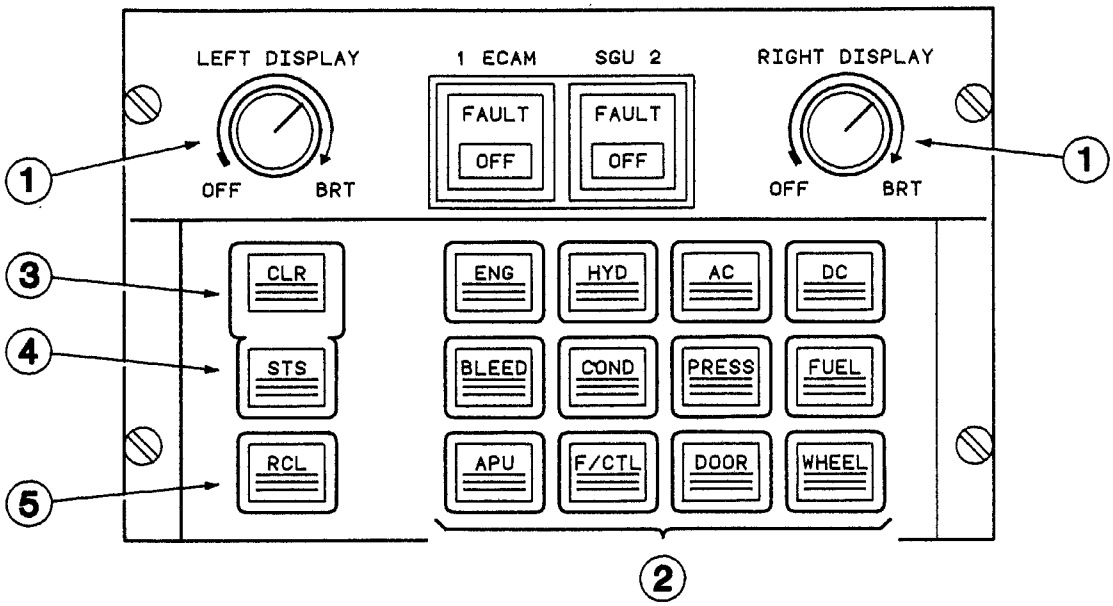
ECAM System Page
(Sheet 2/2)
Figure 006

- Advisory Mode (in flight only)
  When a parameter drifts out of normal range the **R ECAM** display unit shows the relevant system page. **ADV** is flashing in white just after the title.
- Failure Mode
  As soon as a warning is detected the **R ECAM** shows the warning associated page. This mode has priority over all other modes but can be superseded by a manual call of a system page. It is disengaged by suppression of the associated warning messages (**CLR** or failure disappearance).

D. ECAM Control Panel
(Ref. Fig. 007)
The **ECAM** control panel allows to:
- clear a warning
- call manually the **STATUS** function
- recall of a failure
- select manually a system page.

E. MASTER WARNING and **MASTER CAUTION** Lights
(Ref. Fig. 008)
The **MASTER WARNING** and **MASTER CAUTION** lights provide a visual warning without identification of the system.

F. AUDIO CANCEL Panel **417VU**
(Ref. Fig. 009)



(1) BRIGHTNESS KNOBS

USED TO SWITCH ON EACH ECAM DISPLAY AND ADJUST THE BRIGHTNESS OF THE IMAGES.

(2) SYSTEM PUSHBUTTONS

ALLOWS THE MANUAL SELECTION OF A SYSTEM DISPLAY.DISENGAGEMENT IS OBTAINED BY PRESSING THE ILLUMINATE SYSTEM P/B SW OR ANOTHER ONE,OR AUTOMATICALLY IF A WARNING OR AN ADVISORY OCCURS.

(3) -CLR PUSHBUTTON SWITCH

LIGHT COMES ON WHITE AS LONG AS A WARNING OR STATUS MESSAGE IS PRESENT ON THE L ECAM DISPLAY UNIT,PRESS THE CLR P/B SW AS MANY TIMES AS NECESSARY UNTIL THE CLR LIGHT GOES OFF,TO CHANGE THE MESSAGE DISPLAYED AND CLEAR THE MASTER WARNING AND CAUTION LIGHTS.

(4) -STS PUSHBUTTON SWITCH

ENABLES A STATUS MESSAGE(AIRCRAFT STATUS)TO BE CALLED MANUALLY,IF NO WARNING IS DISPLAYED.

(5) -RCL PUSHBUTTON SWITCH

ENABLES THE WARNING MESSAGES PREVIOUSLY CLEARED TO BE DISPLAYED PROVIDED THE CONDITIONS WHICH GAVE RISE TO THEM ARE STILL PRESENT.

B M 6 49 70 00 0 ANNO-25

ECAM Control Panel
Figure 007

(1) RED WARNING FLASHING LIGHTS(P/B SWITCHES)

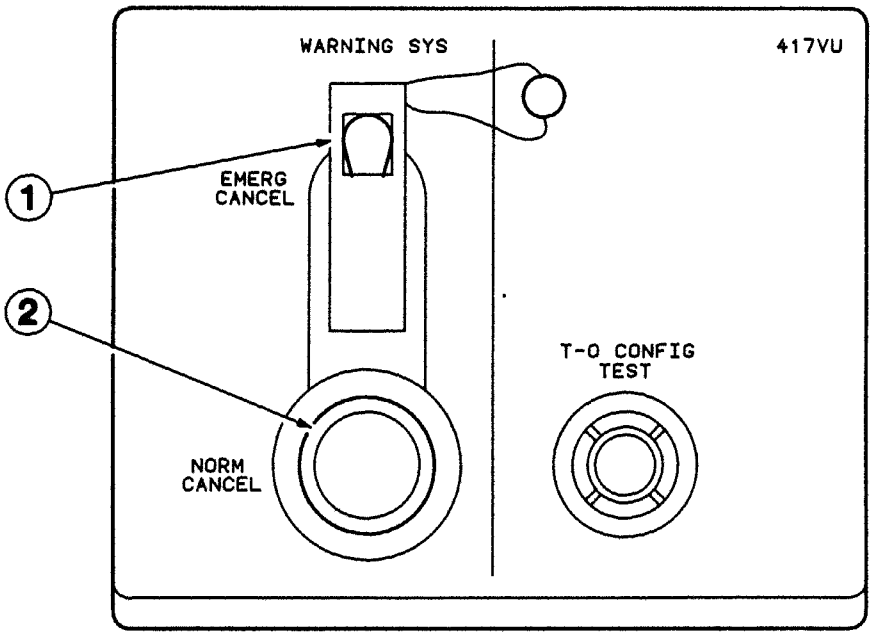
REQUIRE IMMEDIATE CREW ACTION
IN THE EVENT OF A RED WARNING,ACTION ON THE MASTER WARNING LIGHT WILL EXTINGUISH THESE LIGHTS AND STOP THE AURAL WARNING FOR WHICH THE INHIBITION IS AUTHORIZED BY THE OFFICIAL RULES.THIS ACTION HAS NO EFFECT ON ECAM MESSAGES.

(2) AMBER WARNING LIGHTS(P/B SWITCHES)

ACTION TO BE PERFORMED DEPENDS ON CREW DECISION.
IN THE EVENT OF AN AMBER WARNING,ACTION ON THE MASTER CAUTION LIGHT WILL EXTINGUISH THESE LIGHTS AND STOP THE AURAL WARNING.THIS ACION HAS NO EFFECT ON ECAM MESSAGES.

B M 6 49 70 00 0 APN0-25

MASTER WARNING and **MASTER CAUTION** Lights
Figure 008



(1) EMER CANCEL

SWITCH WITH ITS SAFETY WIRED GUARD.IT INHIBITS ALL WARNINGS. IT IS USED IN CASE OF RANDOM AND REPETITIVE WARNINGS WHICH PRODUCE AN OPERATIONAL NUISANCE.

IT ACTS IN SUCH A WAY AS TO ENSURE THAT ONCE A WARNING IS CANCELLED,IT REMAINS CANCELLED EVEN IF THE WARNING CONDITION DISAPPEARS AND RE-APPEARS.CRT MESSAGES ARE GIVEN TO INDICATE THAT THE FUNCTION IS ACTIVATED (EMER CANCEL ON)AND THAT THE SPECIFIC WARNING IS CANCELLED (E.G.APU FIRE WARNING CANCELLED).
THIS CANCEL FACILITY CAN BE RESET BY PRESSING THE RCL PUSHBUTTON ON ECAM CONTROL PANEL FOR MORE THAN 3 SECONDS.

(2) NORM CANCEL

P/B SW ALLOWS TO INHIBIT AURAL WARNINGS WHICH ARE ALLOWED TO BE CANCELLED BY THE OFFICIAL REGULATIONS.

B M 6 49 70 00 0 ARN0-25

WARNING SYS Panel 417VU
Figure 009

POWER INDICATING - DESCRIPTION AND OPERATION

1. General

Two separate sensors protruding into the air inlet plenum chamber monitor the APU spool speed. Each sensor produces a frequency signal. The frequency is proportional to the Revolution Per Minute (RPM).
In the Electronic Control Box (ECB) the frequency signals are converted into signal voltages and compared. Only the highest signal is directed to a current driver which controls the current flow to the RPM indicators.

2. Component Location

R **ON A/C 001-100,

(Ref. Fig. 001)

R **ON A/C 101-200,

(Ref. Fig. 002)

R **ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	SPEED SENSOR 1 (RIGHT)		315	315AL	49-71-13
			316	316AR	
	SPEED SENSOR 2 (LEFT)		315	315AL	49-71-13
			316	316AR	
50KN	INDICATOR-RPM	472VU	212		
57KD	RELAY-INDICATION RELAY	282VU	122	132AZ	
59KD	ELECTRONIC CONTROL BOX		251	251LC	49-61-11

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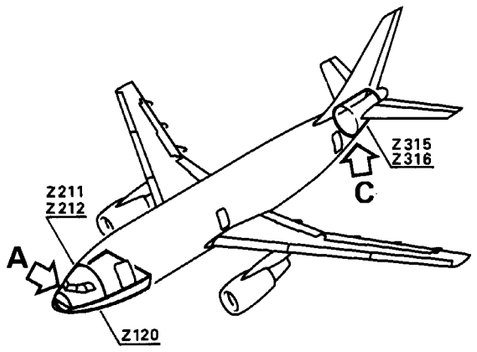

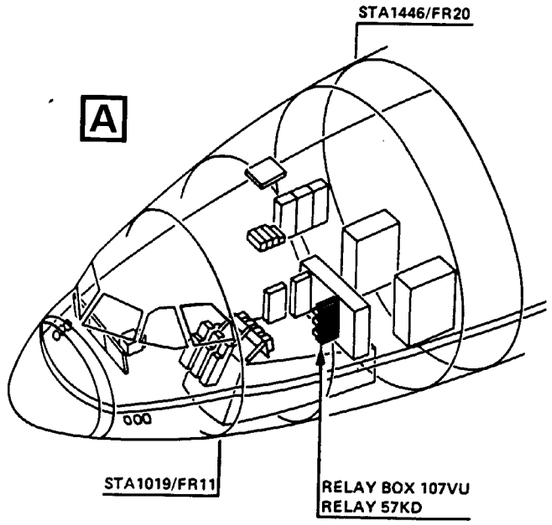

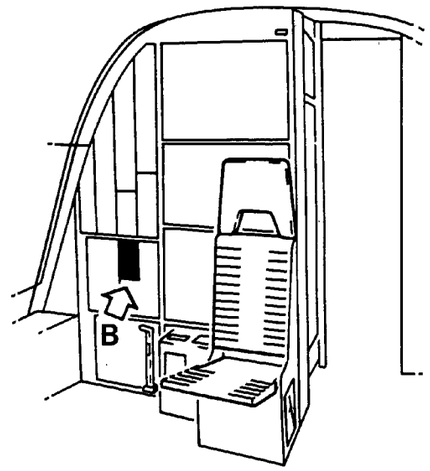

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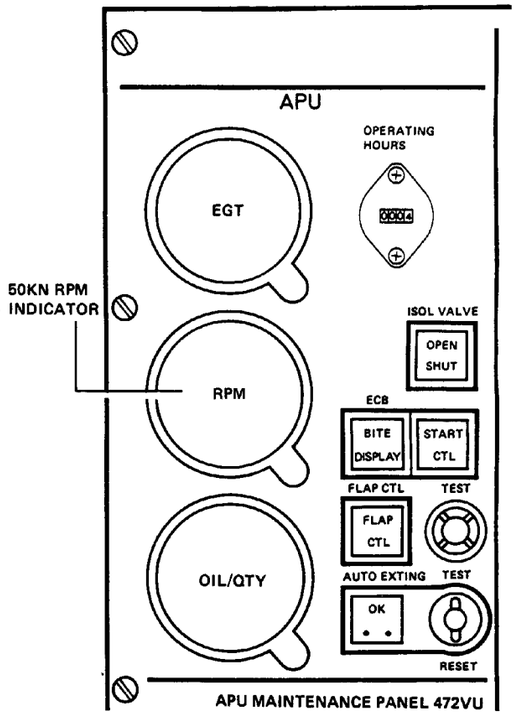

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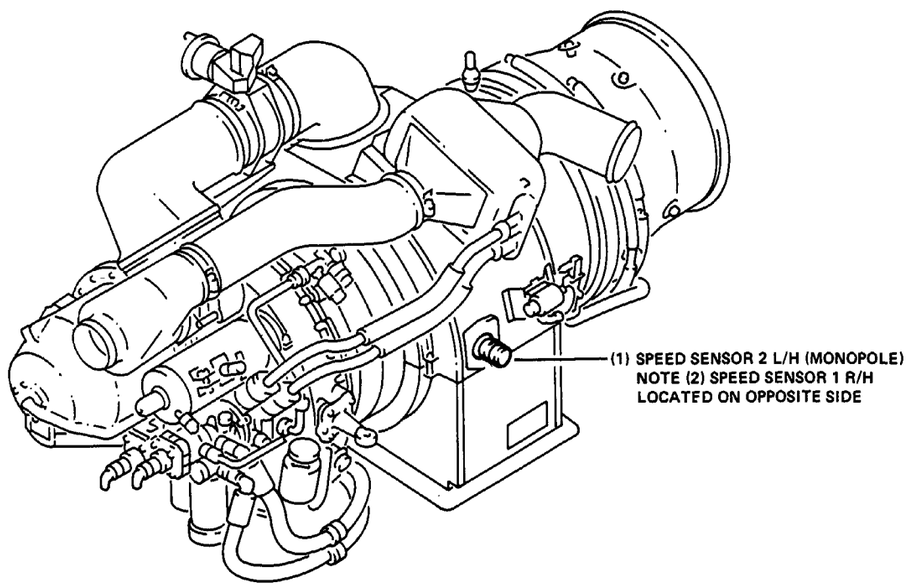

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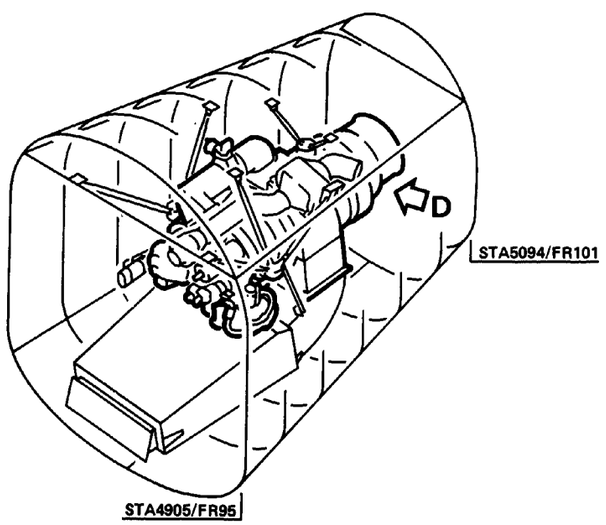
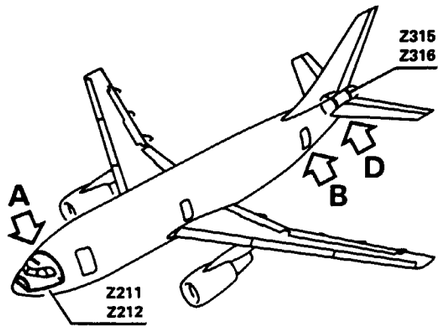
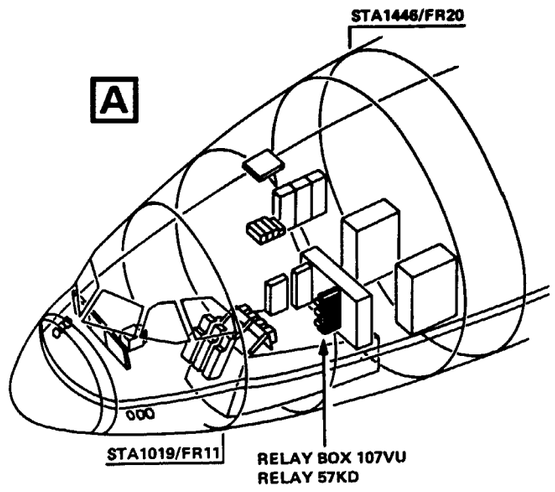
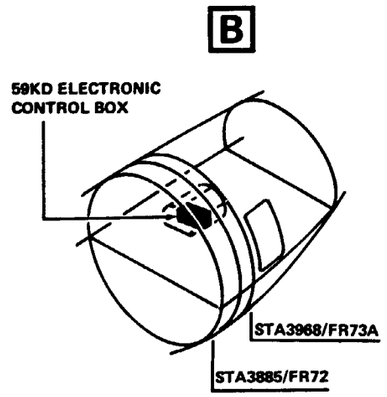


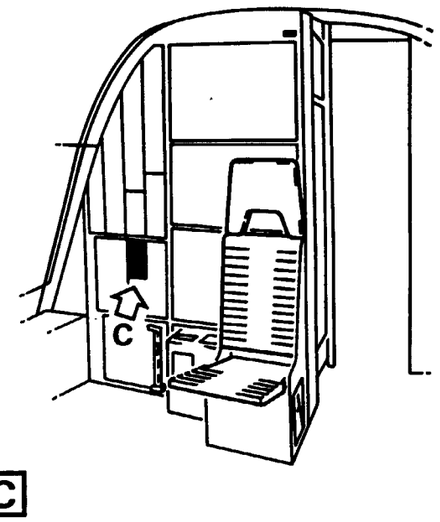
BM6 49 71 00 0 AAE0 00

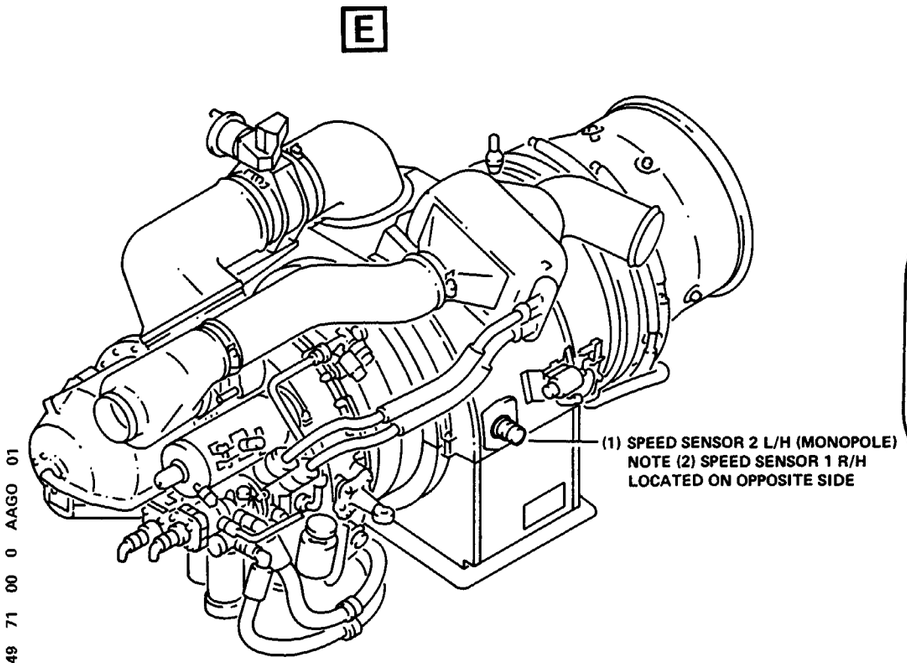
Power Indicating
Figure 001

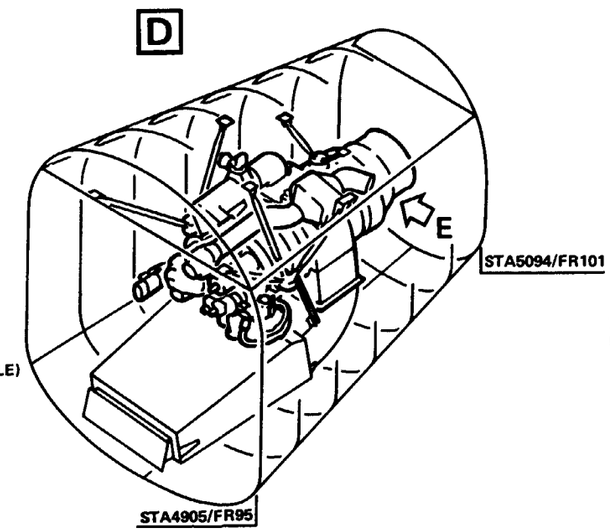


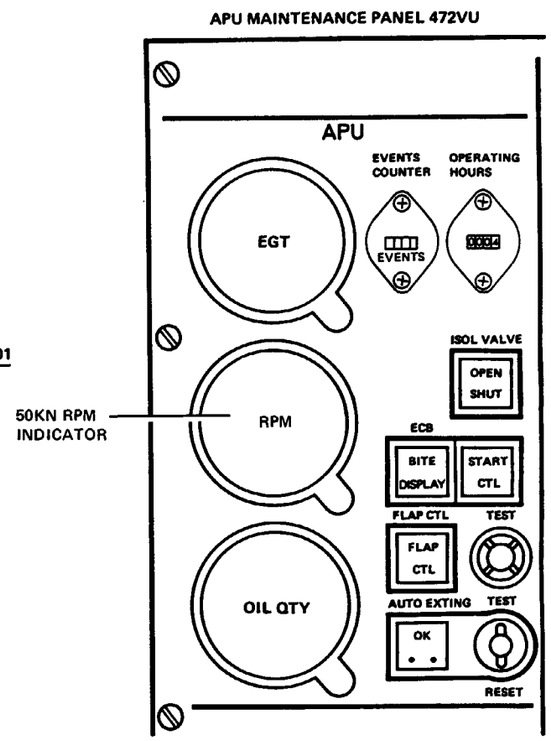












BM6 49 71 00 0 AAGO 01

Power Indicating
Figure 002

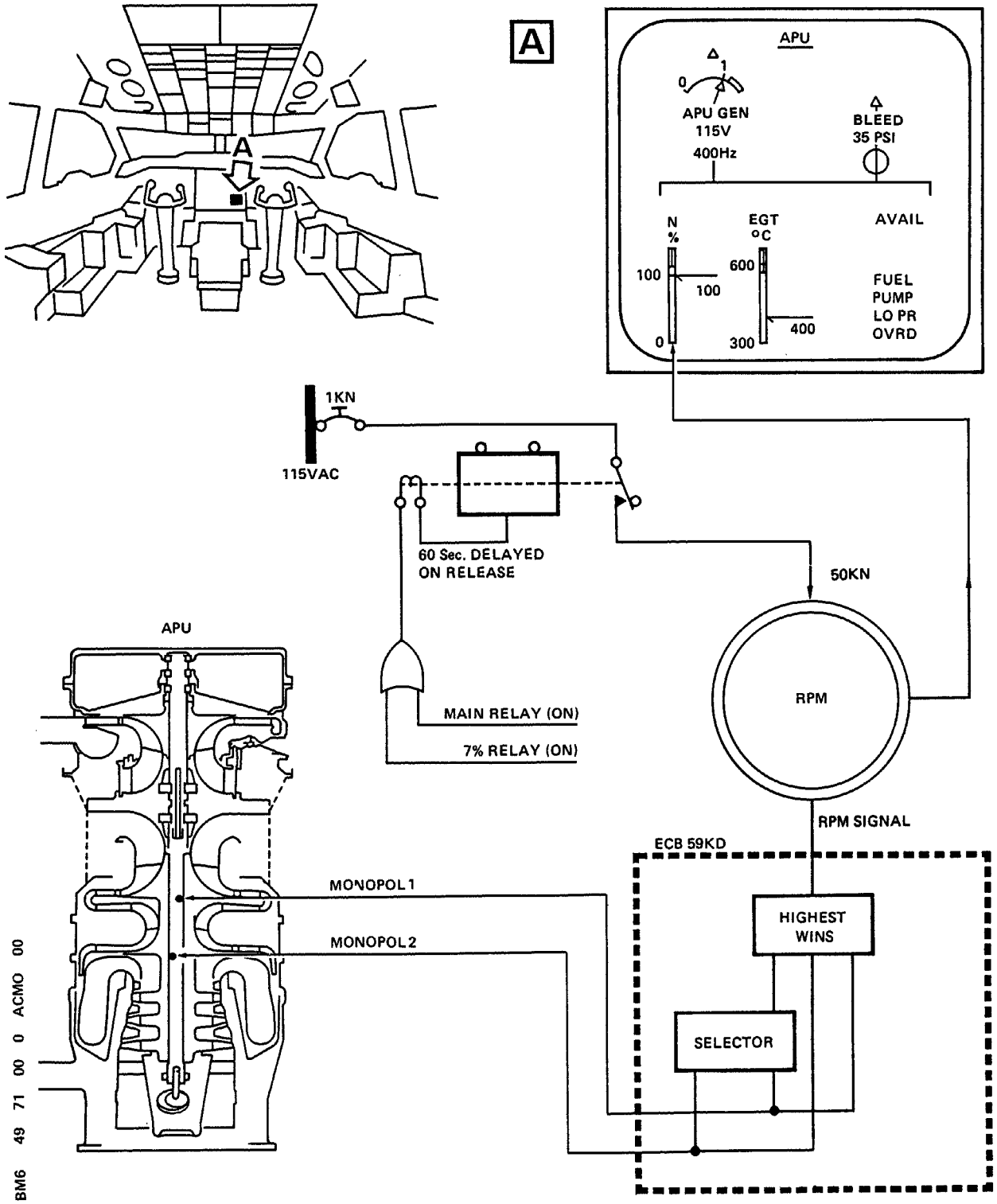
3. Description

A. Monopoles
The speed sensor is a magnetic noncontact, variable reluctance transducer (monopole) that converts mechanical motion into electrical energy. The sensor is located in order to sense APU drive shaft motion under all conceivable failure modes.

B. Electronic Components in the ECB
The Electronic Control Box (ECB) 59KD contains the electronic components necessary to progress the signals from the speed sensors to the RPM indicator and to the Electronic Centralised Aircraft Monitoring (ECAM) system (Ref. 31-51-00).
The input frequency signals produced by the two monopoles are directed to signal conditioners, which convert the frequency signals into DC-signals. A third signal conditioner produces an average signal obtained from the other two signal conditioners. All three signals are directed to the discriminator (Highest Wins System) where only the highest signal is accepted. This highest signal is directed to a current driver where it controls a current flow proportional to the RPM.

C. Indicator
The RPM indicator 50KN is installed on the APU maintenance panel 472VU. The indicator is supplied with 115V/400Hz. The input signals are indicated on the scale from 0 to 120% RPM of nominal engine speed. The indicator is active when MASTER SW 14KD is ON, but inactive in the shutdown sequence 60 sec. after the APU speed is below 7% RPM. The RPM indicator is supplied via the time delay relay 25KD and indication relay 57KD which is controlled by the APU main relay 4KD and the 7% relay 51KD. This ensures that the indicator is supplied with power 60 seconds longer than the APU system, to allow the pointer of the instrument to return to zero. The scale has the following color coding:
- green: 96% - 104% normal speed range
- amber: 104% - 109% upper speed range
- red radial at 109% beginning of overspeed

D. ECAM - APU System Display (Ref. Fig. 003)
Both ECAM display units are installed in the flight compartment main instrument panel. The signal from the speed sensors passes through the ECB to the RPM indicator unit and then into the ECAM system. The normal display color is green. However, if a speed of ≥107% N is achieved, the indicator color changes to amber (Ref. 31-51-00) (Ref. Fig. 003).
(Ref. Fig. 003)



RPM Indication - Block Diagram
Figure 003

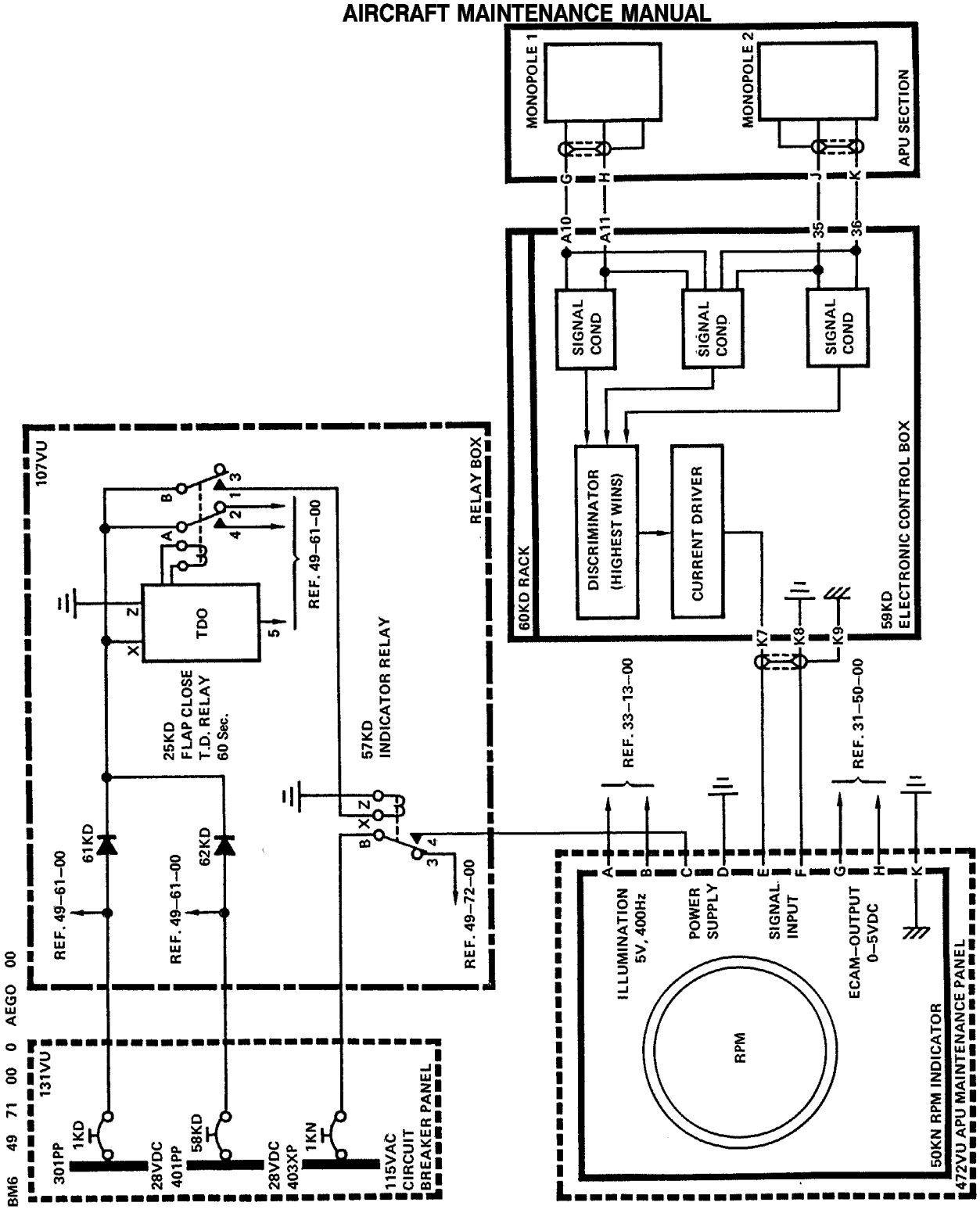
4. Operation

(Ref. Fig. 004)

A. During the operation of the APU, two monopoles produce frequency signals proportional to the engine spool speed. These signals are directed to the ECB which convert the frequency signals into DC-signals.
The (Highest Wins System) in the ECB accepts only the highest signal, which will drive the indicator via a current signal, which is linearly proportional to the APU speed.

(1) An output voltage signal 0 to 5V DC equivalent to 0 to 120% RPM input signal is provided by the indicator. It will be used for ECAM system (Ref. 31-50-00).

(2) After the master switch 14KD is switched off and engine speed is below 7% RPM, the RPM indicator is functional for an additional 60 seconds via time delay relay 25KD and indicator relay 57KD.



RPM Indication - Schematic
Figure 004

SPEED SENSOR - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Cap and Plugs
C.	Circuit Breaker Safety Clips and Tags
D. 294864-1	Wrench, Transducer Removal
E.	O-Ring

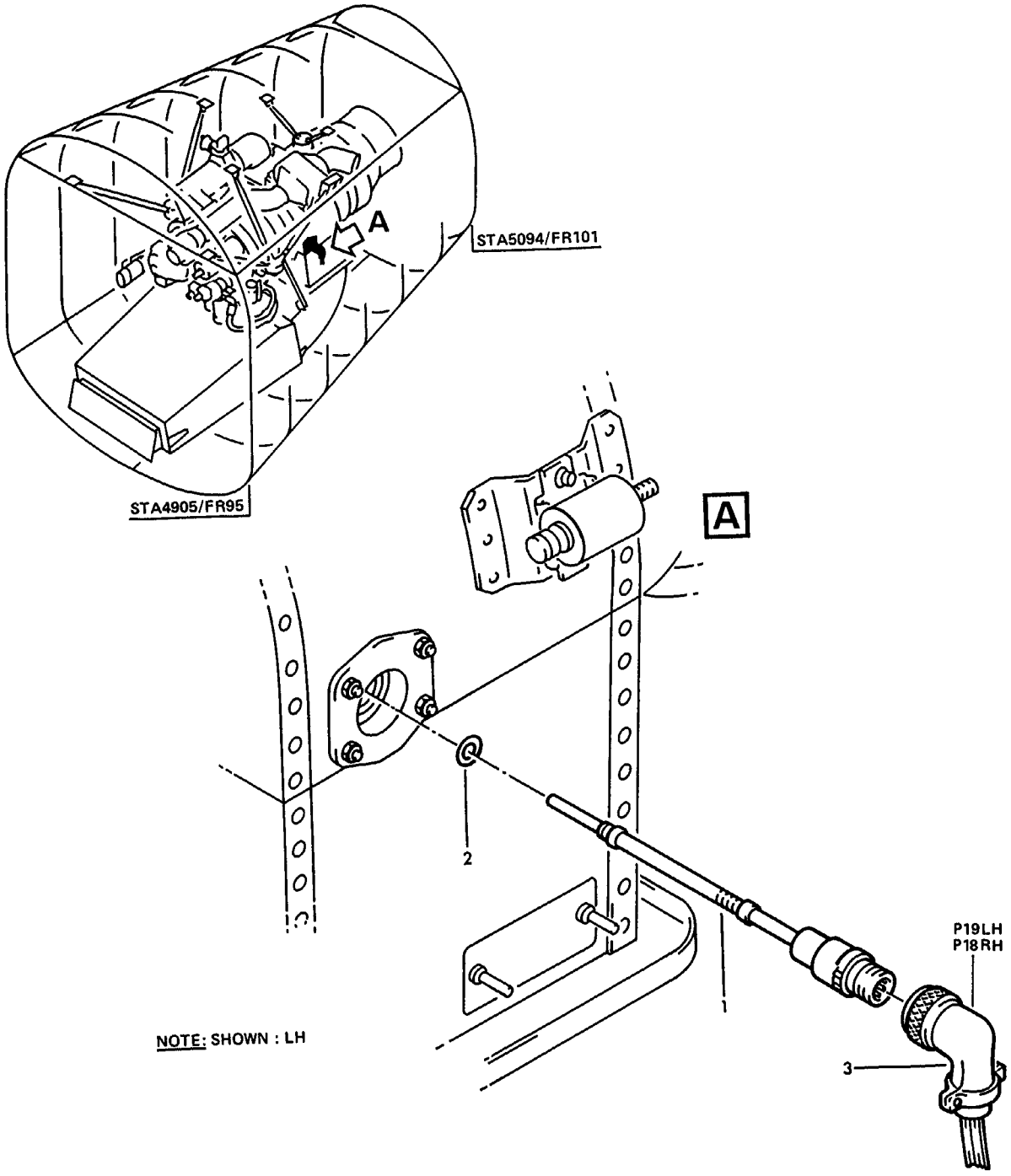
Referenced Procedure

- 49-10-00, P. Block 501	Power Plant

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



BM6 49 71 13 4 AAMO 01

Speed Sensor
Figure 401

(2)Position access platform and open access door 315AL and 316AR.

B. Removal
(1)Disconnect electrical connector P19 (on RH side P18) (3) and fit blanking cap and plug.
(2)Remove speed sensor (1) using transducer removal wrench.
(a)Remove and discard O-ring (2).
(3)Fit blanking plug to orifice of inlet plenum housing.
(4)Remove safety clips and tags and close circuit breakers 50KA, 1KD and 71KD.

C. Installation
(1)Remove blanking plug from inlet plenum housing.
CAUTION : TO PREVENT DAMAGE, SPEED SENSOR MUST BE HAND TIGHTENED ONLY.
(2)Fit new O-ring (2), position and hand tighten speed sensor (1).
(3)Remove blanking cap and plug and connect electrical connector P19 (P18) (3).

D. Test
(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(a)On maintenance panel 472VU, observe N indication.
(b)Shut down APU (Ref. 49-10-00, P. Block 501).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

1. General

Two separate thermocouple rakes are installed at the APU tailpipe to monitor the APU Exhaust Gas Temperature (EGT). Each rake produces a signal voltage proportional to the exhaust gas temperature. These voltage signals are amplified and compared in the Electronic Control Box (ECB). Only the higher signal is directed to a current driver which controls the current flow to the exhaust gas temperature indicator. Various additional control and shutdown functions are influenced by this system.

2. Component Location

R **ON A/C 001-100,

(Ref. Fig. 001)

R **ON A/C 101-200,

(Ref. Fig. 002)

R **ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	THERMOCOUPLE RAKE 1		315	315AL	49-72-11
			316	316AR	
	THERMOCOUPLE RAKE 2		315	315AL	49-72-11
			316	316AR	
2KP	INDICATOR-EGT	472VU	212		
57KD	RELAY-INDICATION	107VU	121	132AZ	
59KD	ELECTRONIC CONTROL BOX		251	252JC	49-61-11

3. Description

A. Thermocouple Rakes

The exhaust gas temperature sensor system consists of four individual chromel-alumel thermocouple assemblies with each assembly having two thermocouple probes. The thermocouples are located at 90° intervals on the tailpipe and protrude into the exhaust outlet. A pair of thermocouple assemblies constitute a thermocouple rake and the system consists of two parallel thermocouple rakes. Each thermocouple rake is separately sensed and conditioned by the controller so that the loss of one rake will not influence APU operation. When subjected to heat the thermocouples produce a voltage proportional to the EGT. This voltage is fed through shielded cables to the ECB.

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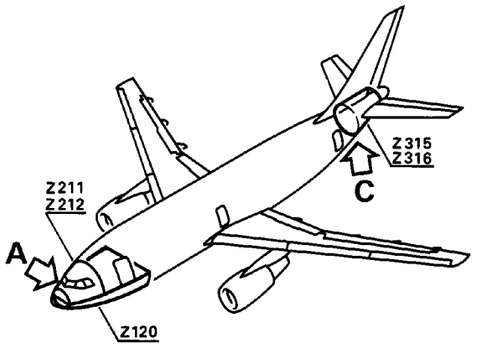
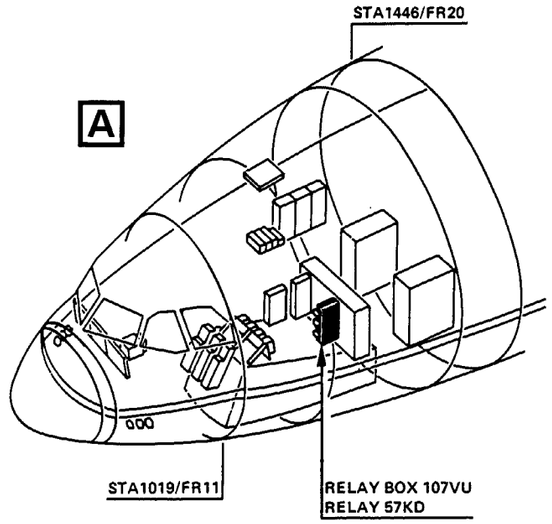
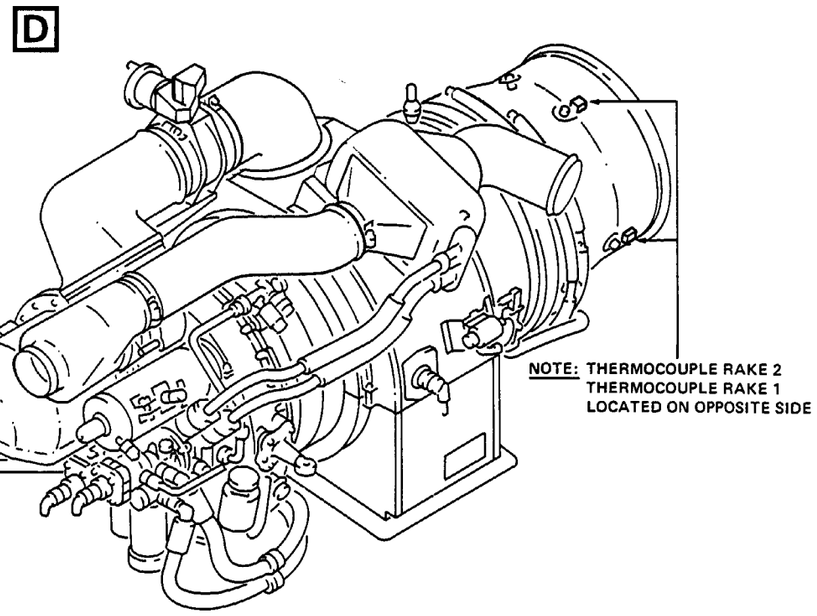
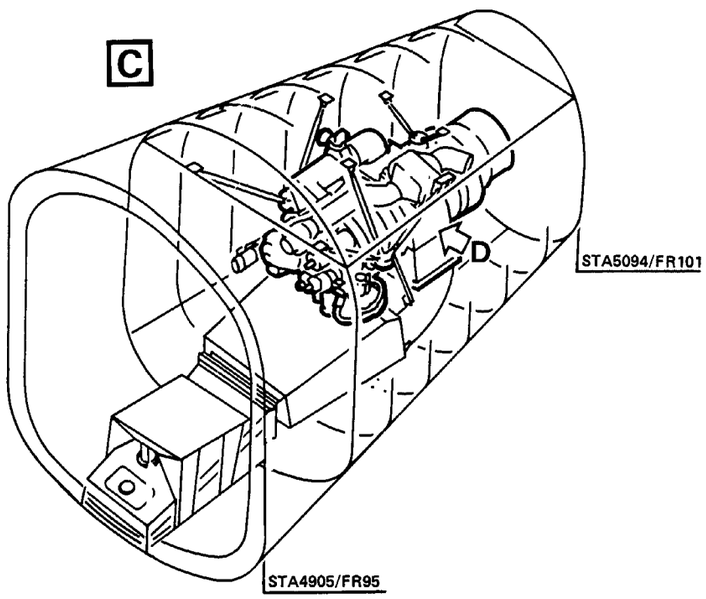
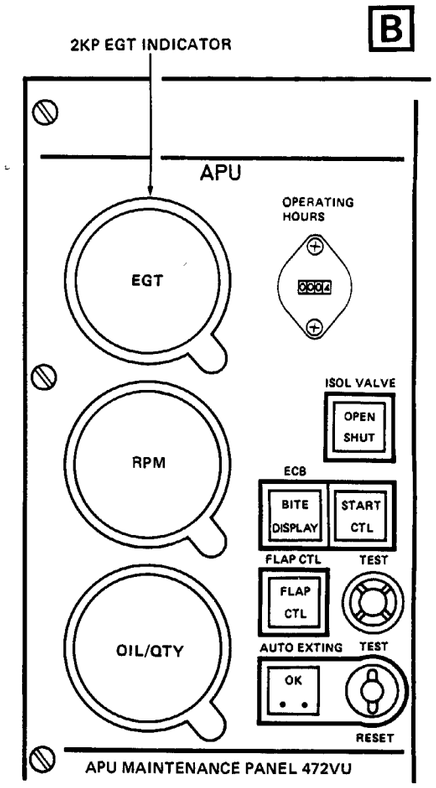




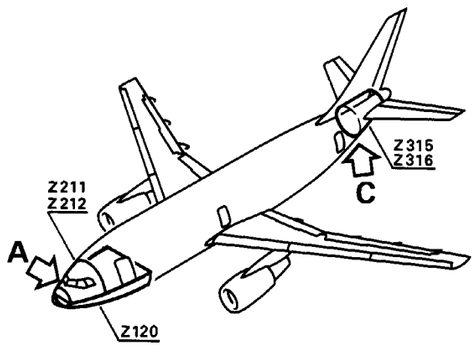


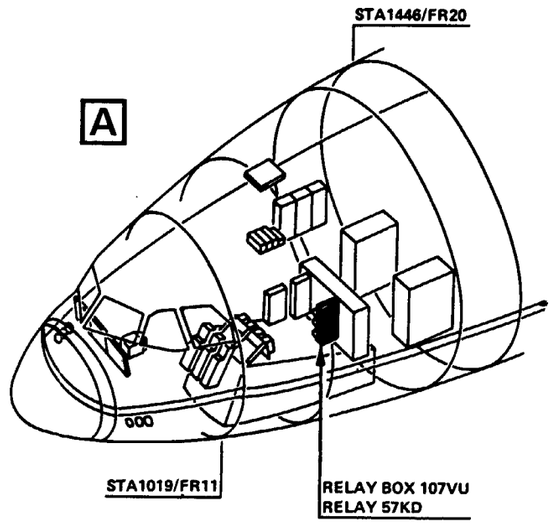


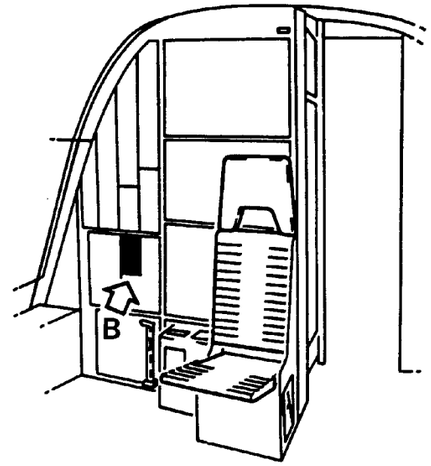


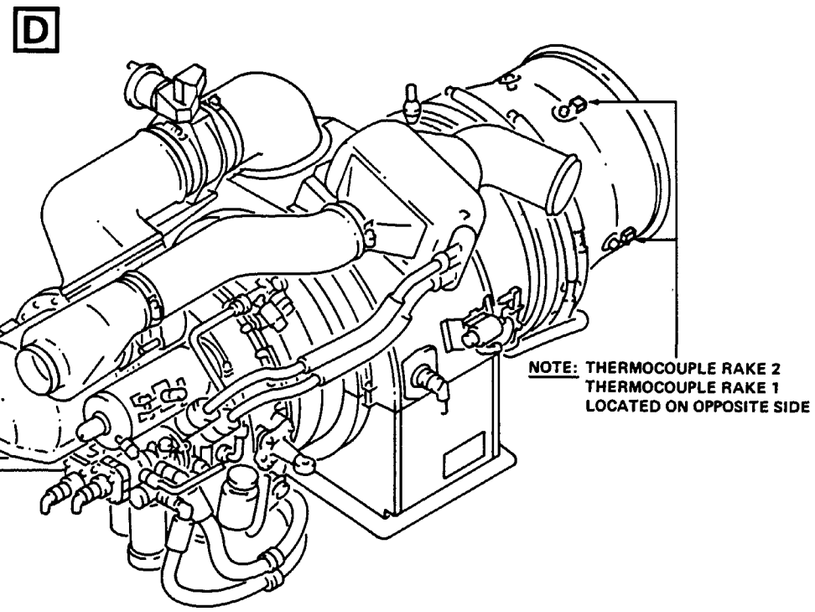
BM6 49 72 00 0 AAEO 00

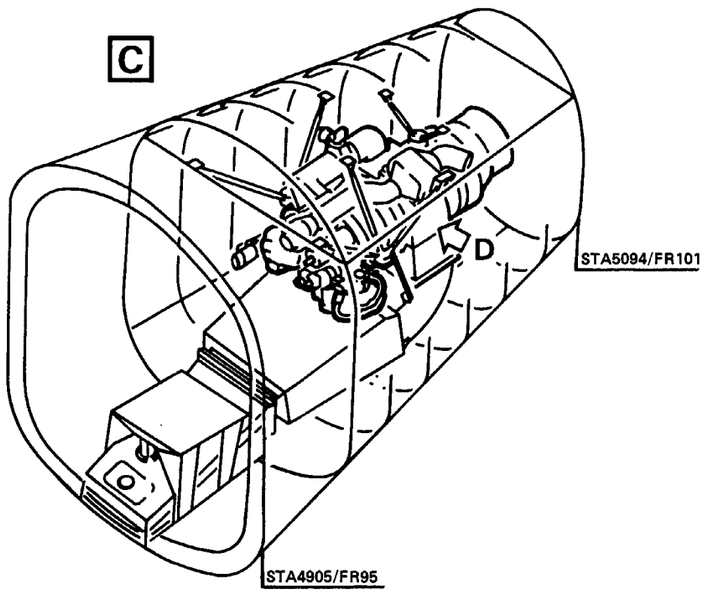
Temperature Indicating
Figure 001

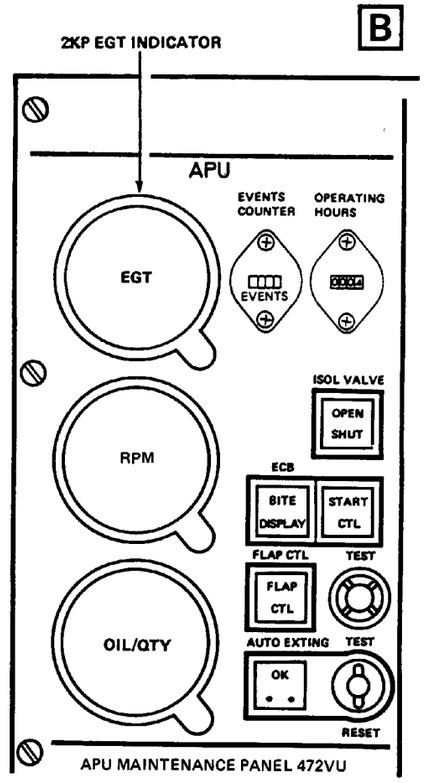












BM6 49 72 00 0 AAGO 00

Temperature Indicating
Figure 002

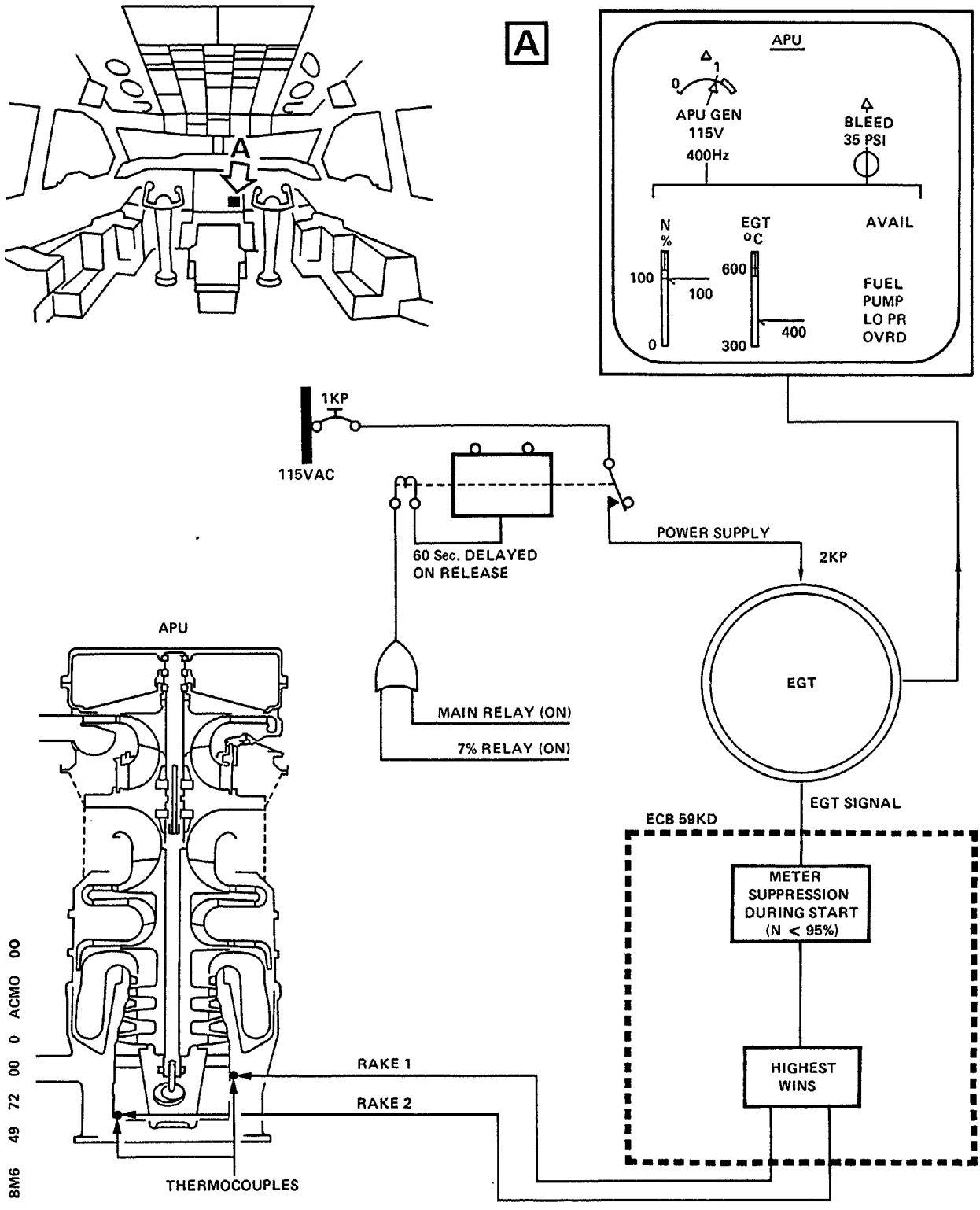
B. Electronic Components in the ECB
The Electronic Control Box (ECB) 59KD contains the electronic components required for signal transmission from the thermocouple rakes to the EGT indicator 2KP.
The input voltages produced by the two thermocouple rakes are directed to two amplifiers. The amplified signals are directed to a discriminator (highest wins system) where only the highest signal is accepted. For indication purposes only this signal is suppressed during the APU starting operation up to 95% RPM. This is necessary to prevent the operator initiating a shutdown as a result of the higher exhaust gas temperatures during the start operation. From the suppressor the signal is directed to a current driver where it controls a current flow to the indicator, which is proportional to the EGT.

C. EGT Indicator
The EGT indicator 2KP is installed on APU maintenance panel 472VU. The indicator is supplied with 115V/400Hz. The input signals are indicated on the scale from 0 to 700°C. The indicator is active when MASTER SW 14KD is ON, but inactive 60 sec. after the engine speed is below 7% nominal RPM in the shutdown sequence. The EGT indicator is supplied via time delay relay 25KD and indication relay 57KD, which is controlled by the APU main relay 4KD and the 7% relay 51KD. This makes sure that the indicator will be supplied with power, 60 seconds longer than the APU system, to allow the pointer of the instrument to return to zero. The scale has the following color coding:
- amber: 540°C to 585°C
- red radial at 585°C

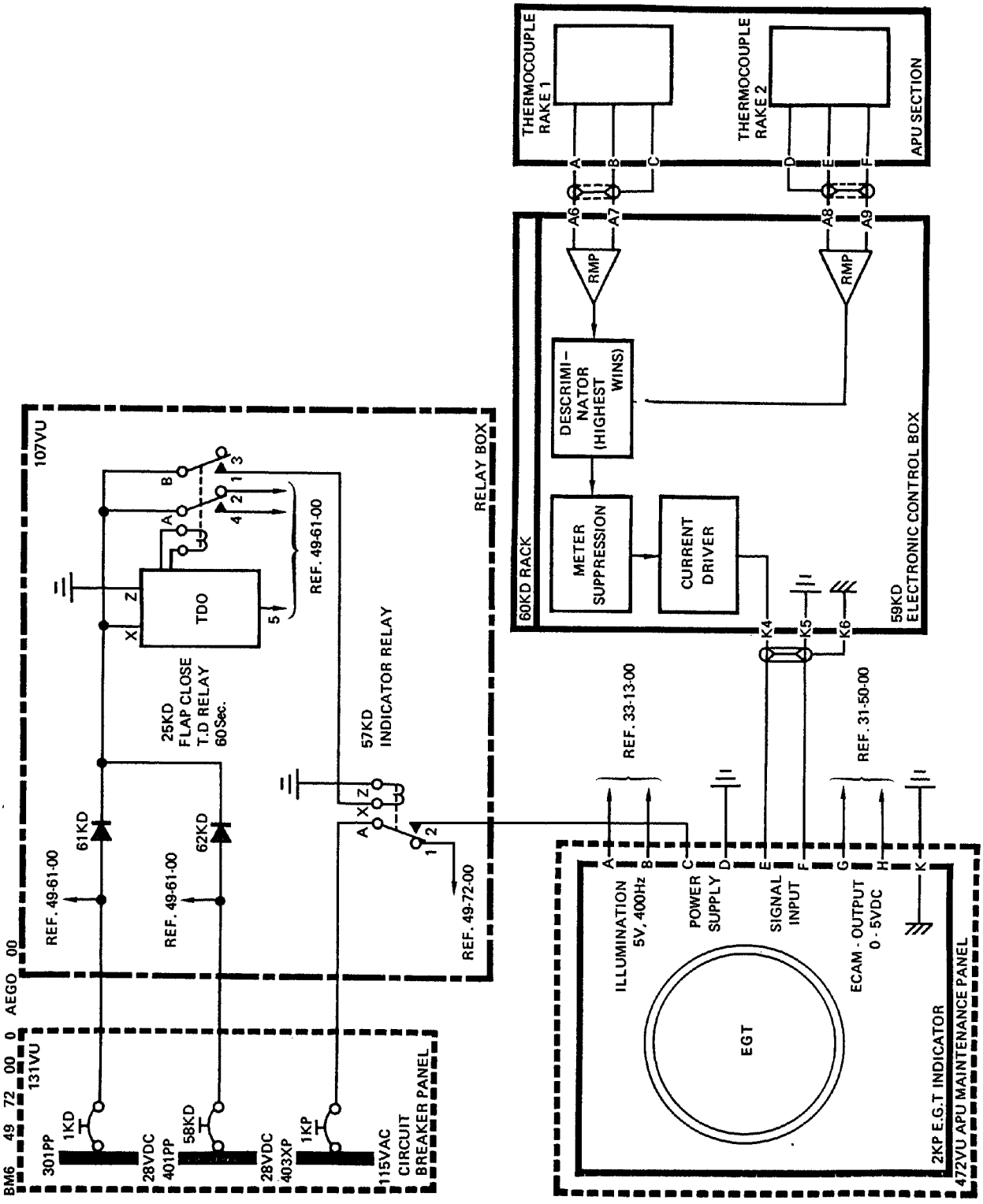
D. ECAM - APU System Display
(Ref. Fig. 003)
Both ECAM (Electronic Centralized Aircraft Monitoring) display units are installed in the flight compartment main instrument panel. The signal from the thermocouples is fed to the ECB and then to the EGT indicator and from there to the ECAM system. The normal display color is green. If the EGT $\geq$540 °C the light flashes, if the EGT $\geq$585 °C the indicator color changes to amber.

4. Operation
(Ref. Fig. 004)

A. During operation of the APU two thermocouple rakes produce signal voltages which are proportional to the EGT. These signals are amplified in the ECB and compared in a discriminator.
The (Highest Wins System) in the ECB accepts only the highest signal, which will drive the indicator via a current signal, which is linearly proportional to the EGT.



EGT Indication - Block Diagram
Figure 003



EGT Indicating - Schematic
Figure 004

1. Removal/Installation

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Plug
(3)	Circuit Breaker Safety Clips and Tags
(4)	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)

Referenced Procedure

- 49-10-00, P. Block 501	Power Plant

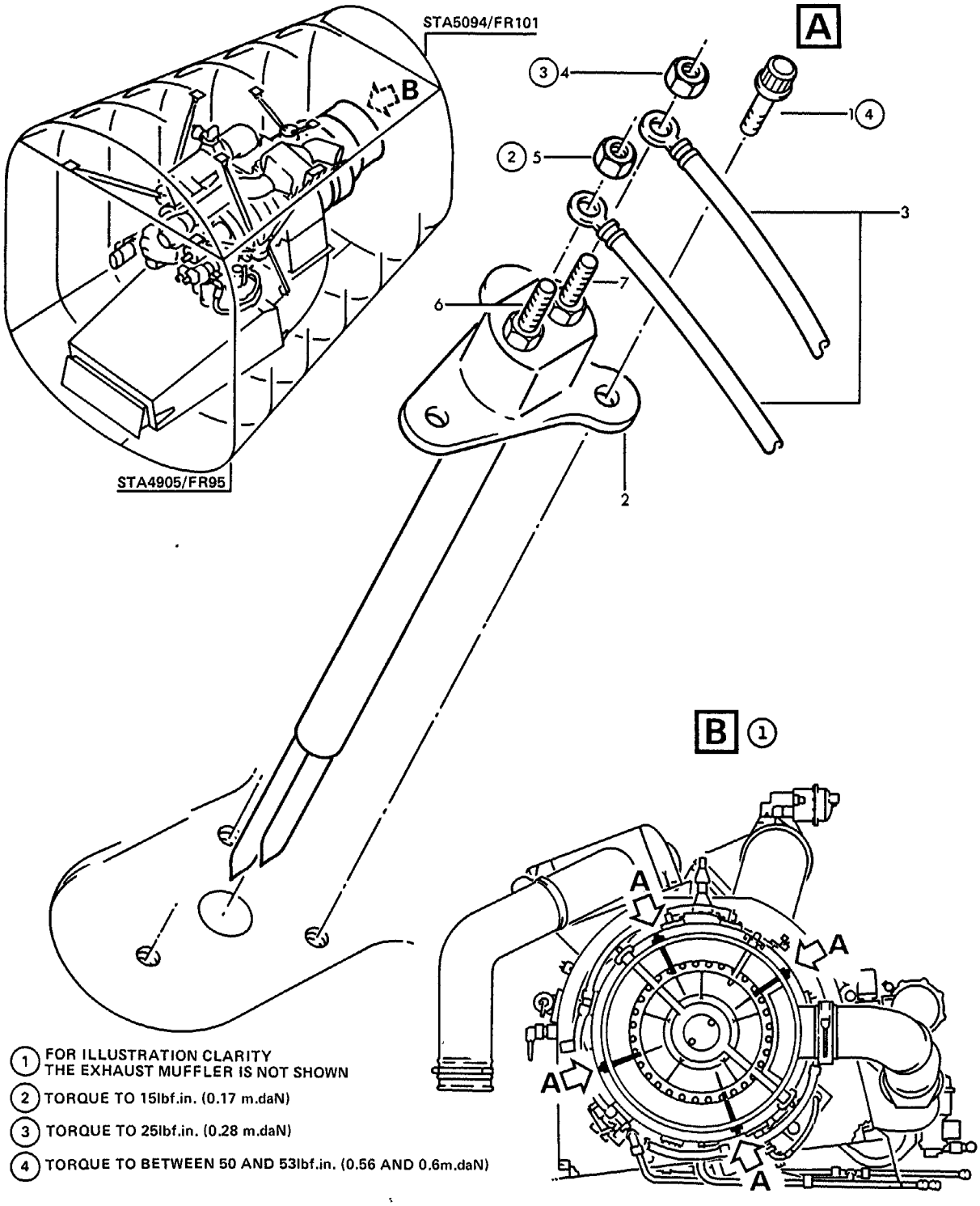
B. Procedure

(Ref. Fig. 201)

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB SUPPLY/BACK UP	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57



Thermocouple
Figure 201

(b)Position access platform and open access doors 315AL and 316AR.
(2)Removal
(a)Remove nuts (4, 5) and disconnect electrical harness (3).
(b)Remove bolts (1) and thermocouple (2).
(c)Fit blanking plug to orifice in turbine plenum.
(3)Installation
(a)Remove blanking plug from orifice in turbine plenum.
(b)Insert thermocouple (2).
(c)Install bolts (1).
1 TORQUE bolts (1) to between 50 and 53 lbf.in. (0.56 and 0.6 m.daN).
CAUTION : TO PREVENT DAMAGE TO STUD CEMENTING IN THE CERAMIC DO NOT OVERTORQUE NUTS (4, 5).
(d)Connect electrical harness (3) and install nuts (4, 5).
(e)TORQUE nut (4) on large dia. stud to 25 lbf.in. (0.28 m.daN).
(f)TORQUE nut (5) on small dia. stud to 15 lbf.in. (0.17 m.daN).
(4)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(5)Test
(a)Start and operate APU (Ref. 49-10-00, P. Block 501).
1 Observe EGT indication.
(b)Check thermocouple attachment for air leakage.
1 Leakage is not allowed.
(c)Shut down APU.
(6)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

2. Inspection

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Magnifying Glass, 7x by 10x
(2)	Multimeter

B. Procedure
(1)Job Set-Up
(a)Remove thermocouple (Ref. Para. 1.).
(2)Inspection
(a)Inspect thermocouple mounting flange welds for cracks or broken welds using magnification.
(b)Inspect for loose fit between the thermocouple probes and the thermocouple housing.
(c)Measure loop resistance across the chromel and alumel terminals, using a multimeter. The resistance shall not exceed 0.5 Ohm at 77 ± 20°F (25 ± 11°C).
(d)Measure insulation resistance from either terminal to the thermocouple case at 500 V DC. Thermocouple shall be replaced, if resistance is less than 10.000 Ohm.

(3)Close-Up
  (a)Install thermocouple (Ref. Para. 1.).

1. General

An analysis of APU performance is facilitated by two units:

- Hourmeter
- Electronic Control Box (ECB) with a Built-in Test Equipment (BITE) system, displayed on the ECB front panel.

2. Component Location

**ON A/C 001-100,

(Ref. Fig. 001)

**ON A/C 101-200,

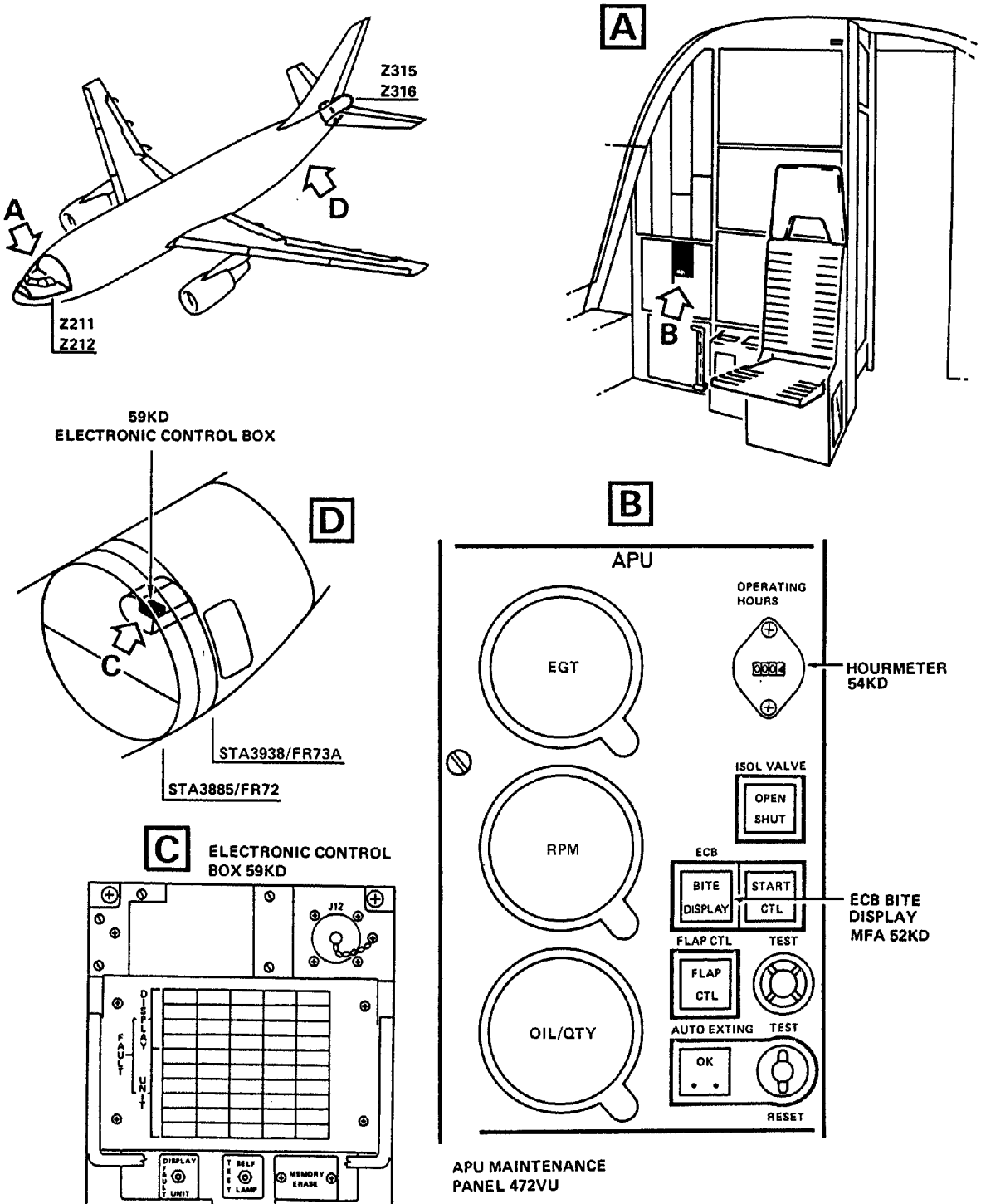
(Ref. Fig. 002)

**ON A/C ALL

	FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
R	54KD	HOURMETER	472VU	212		49-61-21
	52KD	MFA-ECB BITE DISPLAY	472VU	212		
	59KD	CONTROL BOX-ELECTRONIC		251	251JC	49-61-11

**ON A/C 101-200,

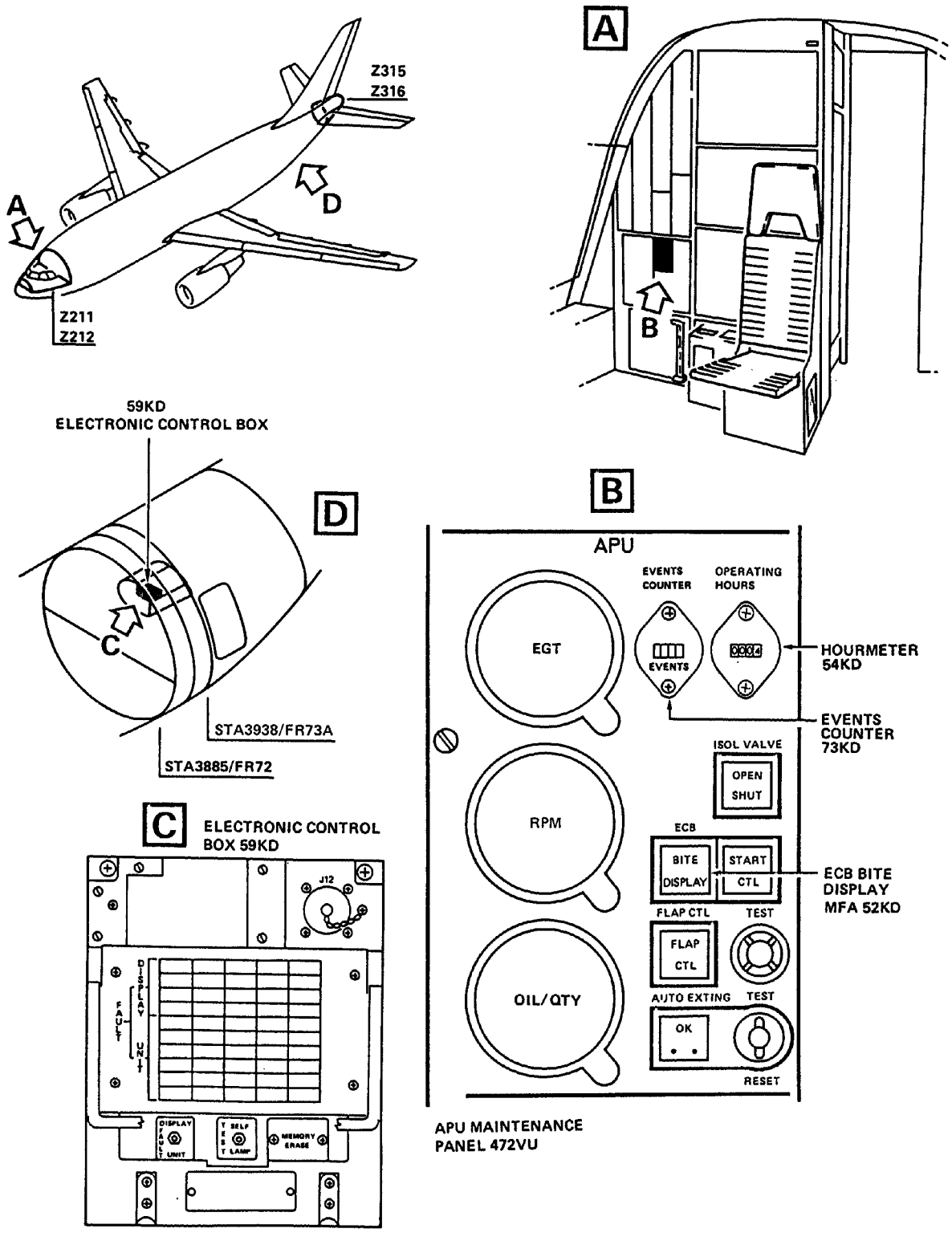
	73KD	COUNTER-EVENTS	472VU	212		



APU MAINTENANCE PANEL 472VU

BM6 49 73 00 0 AAEO 00

Analyzers
Figure 001



APU MAINTENANCE PANEL 472VU

BM6 49 73 00 0 AAGO 00

Analyzers
Figure 002

R **ON A/C ALL

3. Description

A. Hourmeter 54KD, installed in APU maintenance panel 472VU.
The meter is an electrical digital counter. It is supplied with 28V DC and is capable of indicating up to 9999 hours.

R **ON A/C 101-200,

Event counter 73KD, installed in APU maintenance panel 472VU. It is an electrical digital counter and is supplied with 28V DC and is capable of indicating up to 9999 starts.

R **ON A/C ALL

B. ECB 59KD (Ref. Fig. 003, 004)
(1)On the ECB front panel is a display panel, which is divided into two display matrices.
** UP TO ECB P/N 2117402-8

(a)The upper matrix is the FAULT DISPLAY matrix and uses 18 display elements to indicate specific APU faults when the APU protection circuits detect a condition to cause an APU shutdown.
(b)The lower matrix is the FAULT UNIT matrix and comprises 25 FAULT UNIT indicating elements, a WAIT indicating element and a TEST OK indicating element. The FAULT UNIT matrix provides a summary of APU Line Replaceable Units (LRU) detected failed, accumulated and stored in MEMORY.
** FOR ECB P/N 2117402-9 AND SUBSEQUENT

(a)The upper matrix is the FAULT DISPLAY matrix and uses 17 display elements to indicate specific APU faults when the APU protection circuits detect a condition to cause an APU shutdown.
(b)The lower matrix is the FAULT UNIT matrix and comprises 23 FAULT UNIT indicating elements, a WAIT indicating element and a TEST OK indicating element. The FAULT UNIT matrix provides a summary of APU Line Replaceable Units (LRU) detected failed, accumulated and stored in MEMORY.
** For All ECB's

(2)TEST LAMP/SELF switch,
- FAULT DISPLAY/UNIT switch
- MEMORY ERASE switch (covered by a guard)
are located below the display panel, enables interrogation and erasure of memory circuits and testing of the indication system.
(3)An ECB-BITE DISPLAY memorized fault annunciator light 52KD on maintenance panel 472VU, indicates that a fault is stored in the memory of the ECB.

4. Operation
(Ref. Fig. 003, 004, 005)

R **ON A/C 001-100,

(Ref. Fig. 006)

R **ON A/C 101-200,

(Ref. Fig. 007)

R **ON A/C ALL

A. The hourmeter records the operational hours when the RPM has exceeded 95%.

R **ON A/C 101-200,

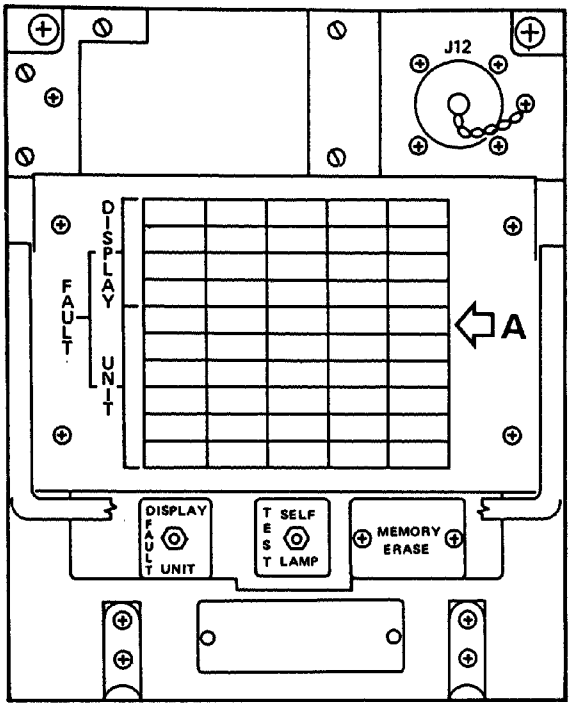
The event counter records the number of starts of the APU when the RPM has exceeded 95%.

R **ON A/C ALL

B. Following test procedures can be carried out on the ECB 59KD:
(1)ECB Lamp Test
(a)Placing TEST toggle switch in LAMP position for min. 5 seconds:
- ECB powers up.
- Each column of display elements comes on for 4 seconds, one column at a time from the left to the right.
- ECB powers down immediately after completion of test.

(2)ECB Self Test
(a)Placing TEST toggle switch in SELF position for min. 5 seconds:
- ECB powers up.
- WAIT display element comes on.
- TST OK display element comes on for 4 seconds if self test was successful.
- If self test was unsuccessful, in the lower matrix one or more FAULT UNIT display elements come on, one at a time for 4 seconds.
- ECB powers down immediately after completion of test.

(3)FAULT DISPLAY Indication
(a)Placing FAULT toggle switch in DISPLAY position for min. 5 seconds:
- ECB powers up.
- The most recent 5 protective shutdowns since last ECB memory erase are stored. The indication sequence is last in/first out.
- In the upper matrix, the relevant protective shutdown display elements come on for 4 seconds each.
- If there is a LRU stored that caused the logical reason for a protective shutdown, that FAULT UNIT display element comes on for 4 seconds, following the FAULT DISPLAY element.
- The WAIT display element comes on between each FAULT DISPLAY element.
- When three or less protective shutdowns are stored the WAIT display



ECB FRONT PANEL

A

DISPLAY

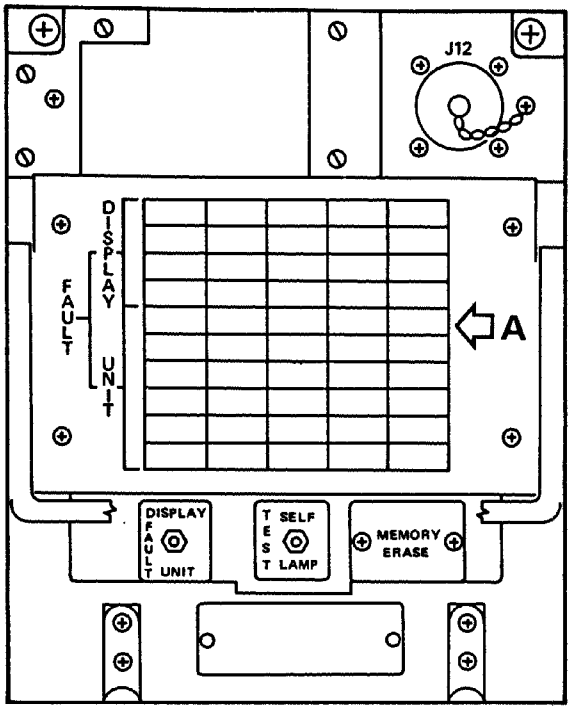
SPARE	ECB	NO ACCEL	SLOW START	NO FLAME
REVRSE FLOW	FAN VALVE	LOSS DC PWR	LOP	SPARE
INLET DOOR	O'CURR	S/D CKT	HOT	O'SPD
GEN HOT	SPARE	FIRE EMERG	O'TEMP	FAILED SENSOR

FAULT UNIT

FAN VALVE	LCIT SENSOR	FUEL SOL	PT SENSOR	ΔP SENSOR
# 1SPD	# 1SPD	LOP SW	FUEL CONTRL	SURGE VALVE
# 1 T/C RAKE	# 2 T/C RAKE	IGV ACT	IGN UNIT	DEOIL SOL
FLOW DIVDER	ECS CONTRL	APU STARTR	STARTR CKT	HOT SENSOR
P2 SENSOR	ECB	LD VAL SOL	SPARE	SPARE
SPARE	SPARE	SPARE	WAIT	TST OK

BM6 49 73 00 0 ACMO 00

ECB - Front Panel
ECB P/N 2117402-9 and subsequent
Figure 003



ECB FRONT PANEL

A

DISPLAY

SPARE	ECB	NO ACCEL	SLOW START	NO FLAME
REVRSE FLOW	FAN VALVE	LOSS DC PWR	LOP	SPARE
INLET DOOR	O'CURR	S/D CKT	HOT	O'SPD
GEN HOT	GEN FILTER	FIRE EMERG	O'TEMP	FAILED SENSOR

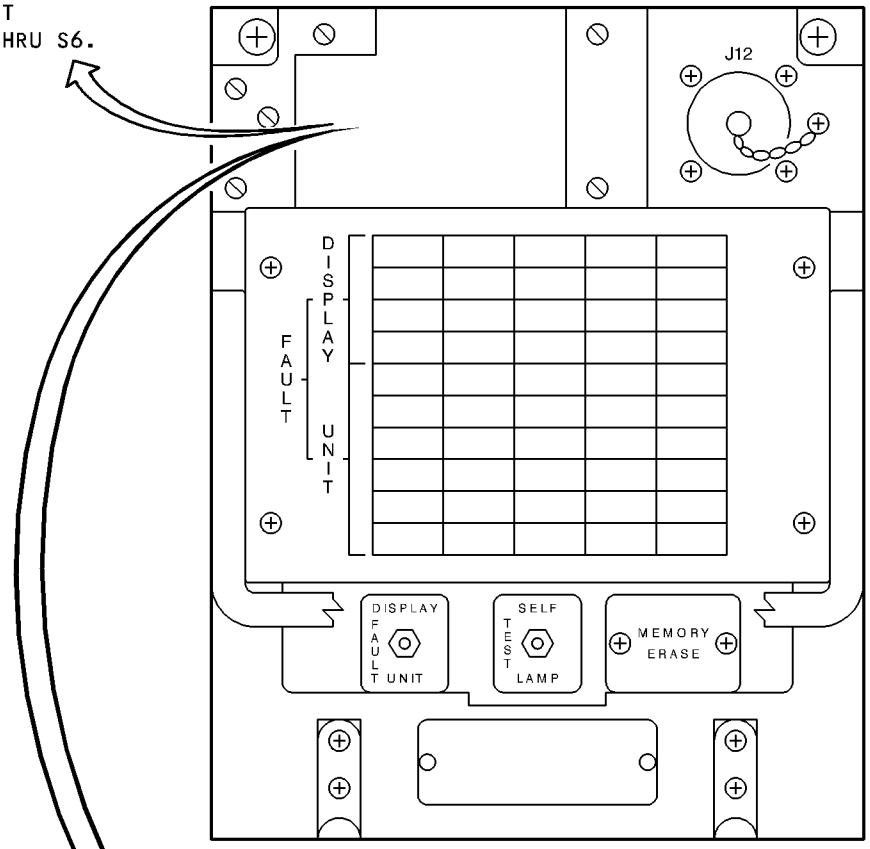
FAULT UNIT

FAN VALVE	LCIT SENSOR	FUEL SOL	PT SENSOR	ΔP SENSOR
# 1SPD	# 1SPD	LOP SW	FUEL CONTRL	SURGE VALVE
# 1 T/C RAKE	# 2 T/C RAKE	IGV ACT	IGN UNIT	DEOIL SOL
FLOW DIVDER	ECS CONTRL	APU STARTR	STARTR CKT	HOT SENSOR
P2 SENSOR	ECB	LD VAL SOL	FILTER SW	GEN FILTER
SPARE	SPARE	SPARE	WAIT	TST OK

BM6 49 73 00 0 ACNO 00

ECB - Front Panel
Up to ECB P/N 2117402-8
Figure 004

NOTE: REMOVE ACCESS PANEL COVER (5 CAPTIVE SCREWS) TO SET SWITCHES S1 THRU S6.



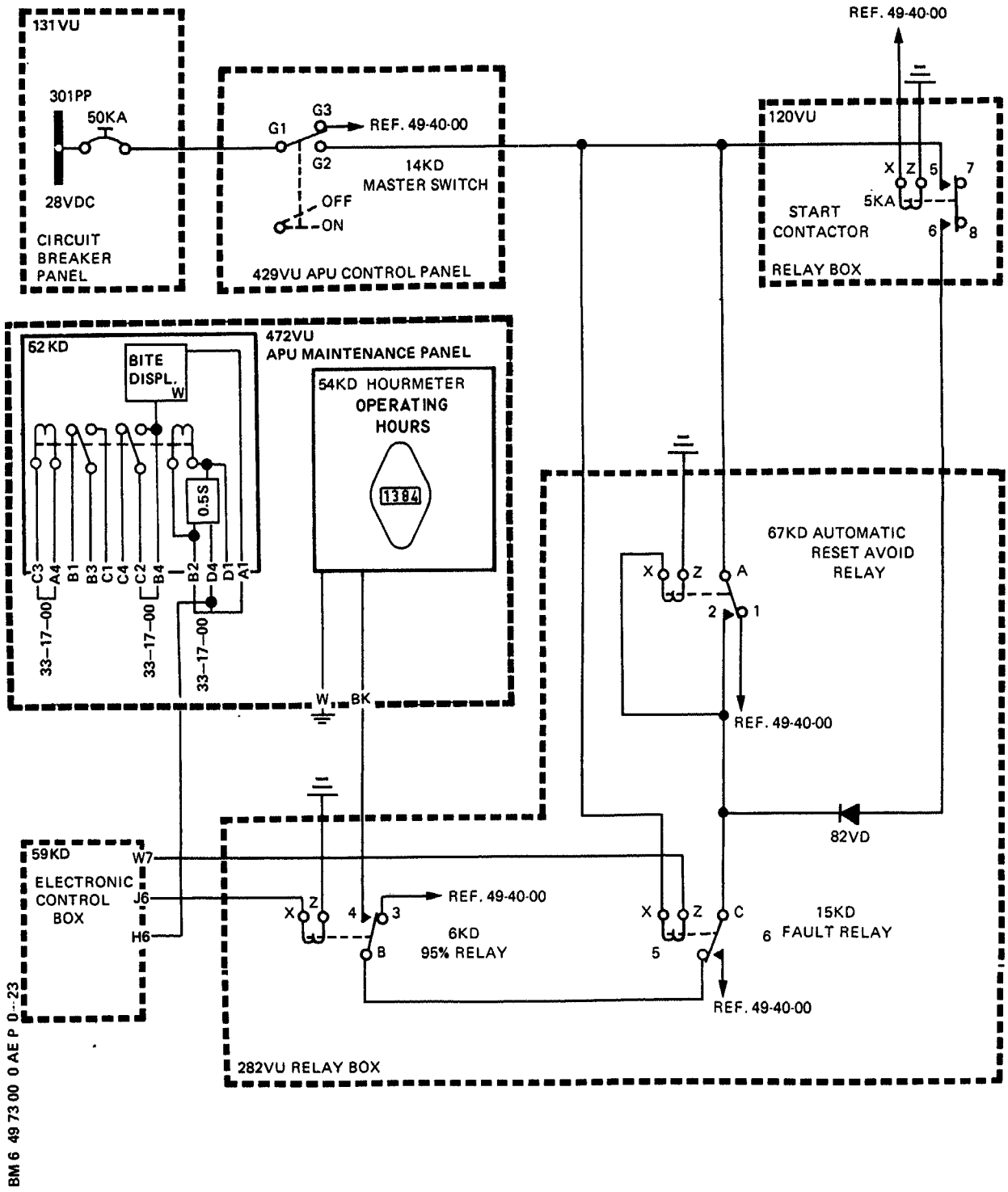
ECB FRONT PANEL

BITE DISPLAY INSTRUCTIONS

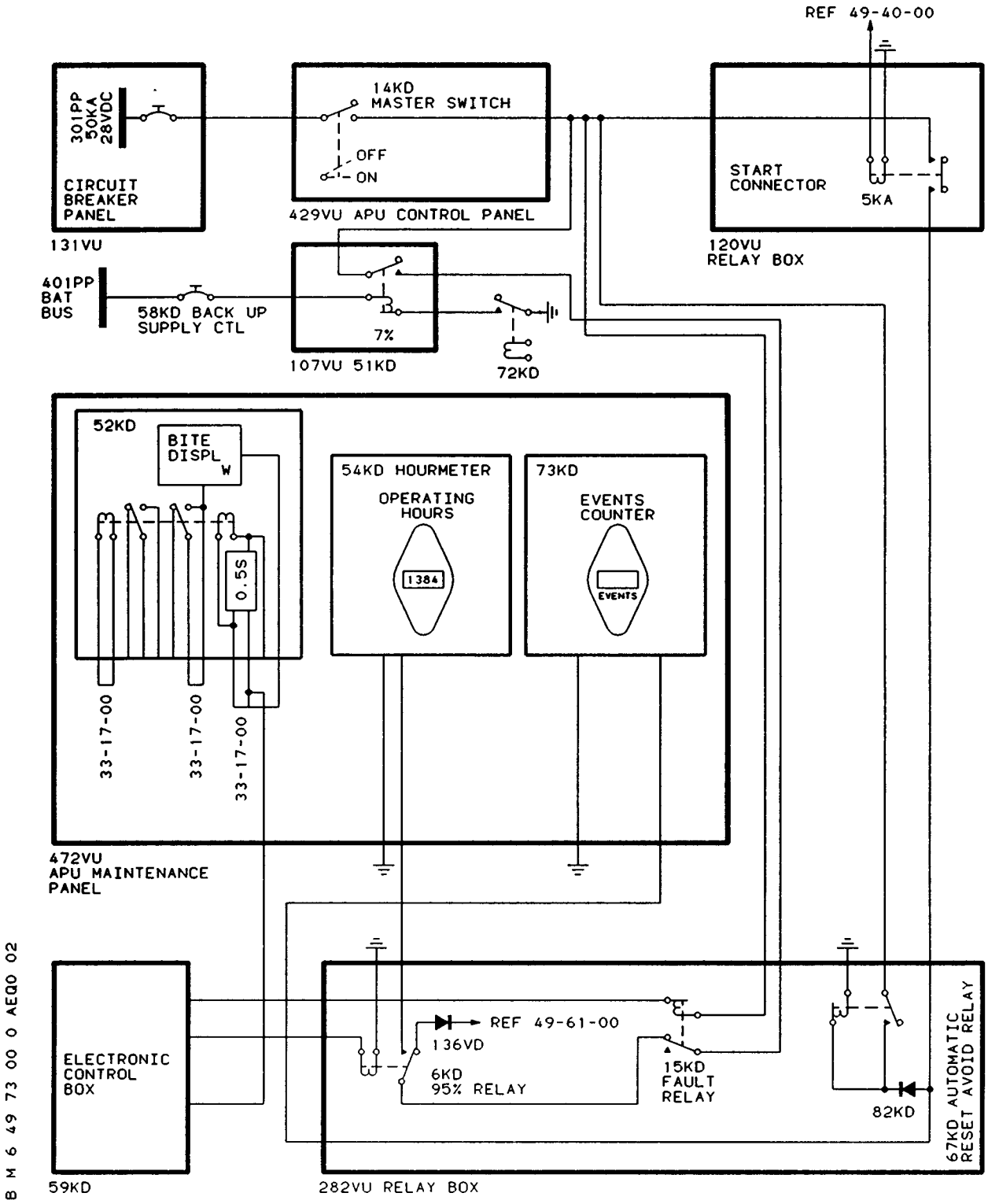
1. APU MASTER SWITCH TO OFF/APU LESS THAN 7%
2. TO DISPLAY FAULTS, SWITCH MOMENTARILY TO "FAULTS DISPLAYED" POSITION.
3. TO DISPLAY FAULTY UNITS, SWITCH MOMENTARILY TO "FAULT UNIT"
4. TO SELF TEST, SWITCH MOMENTARILY TO "SELF TEST" FOLLOWING "WAIT" FAULTY UNITS ARE DISPLAYED.
5. TO ERASE MEMORY, MOMENTARILY PRESS "MEMORY ERASE" SWITCH.
6. TO CHECK DISPLAY, MOMENTARILY SWITCH TO "LAMP TEST" DISPLAYS ONE COLUMN AT A TIME.

BM6 49 73 00 0 ADM0 02

ECB - BITE DISPLAY Instructions
ECB P/N 2117402-8 and Subsequent
Figure 005



Hourmeter Function - Schematic
Figure 006



Hourmeter Function - Schematic
Figure 007

element followed by the **TST OK** display element comes on after the last protective shutdown indication.

- **ECB** powers down immediately after the display sequence.

(4)FAULT UNIT Indication
(a)Placing the FAULT toggle switch in UNIT position for min. 5 seconds:
- ECB powers up.
- In the lower matrix, the relevant FAULT UNIT display elements come on for 4 seconds in sequence from top to bottom and left to right column.
  The indication sequence of faulty LRU's are not identical to the fault detection sequence.
- If there are no faulty LRU's stored, the TST OK display element comes on.
- ECB powers down immediately after completion of the display sequence.

(5)ERASE MEMORY
(a)Placing MEMORY ERASE toggle switch in the upper position:
- ECB powers up.
- All stored faults will be erased within approx. 20 seconds. During this time the WAIT display element comes on.
- Upon completion of the memory erase procedure, the TST OK display element comes on for 4 seconds.
- ECB powers down immediately.

(6)The abbreviated ECB display panel designations and LRU BITE test designations are listed and explained in the following:

(a)FAULT - DISPLAY

- ECB — Electronic control box
- FAILED SENSOR — Sensor fault
- FIRE EMERG — Fire emergency
- GEN FILTER — Generator oil filter clogged

  NOTE : GEN FILTER is applicable only up to ECB P/N 2117402-8.
- HOT — High oil temperature
- INLET DOOR — APU air intake flap actuator
- FAN VALVE — Cooling fan shutoff valve
- O'CURR — Overcurrent
- GEN HOT — Generator high oil temperature
- LOP — Low oil pressure
- LOSS DC PWR — Loss of electrical power supply (DC)
- NO ACCEL — No acceleration
- NO FLAME — Flame out or no start
- O'SPD — Overspeed condition
- O'TEMP — Overtemperature condition
- RVRSE FLOW — Reverse load compressor air flow
- S/D CKT — APU shutdown circuit
- SLOW START — APU not starting within start cycle

(b)FAULTY - UNIT

- APU STARTR Auxiliary power unit starter motor
- DEOIL SOL Normally closed solenoid valve (deoil)
- ECS CONTROL Environmental control system
- ECB Electronic control box
- FAN VALVE Cooling fan shutoff valve
- FILTER SW Generator oil filter differential pressure switch
  NOTE : FILTER SW is applicable only up to ECB P/N 2117402-8.
- FLOW DVDER Fuel flow divider
- FUEL CONTROL Fuel control torque motor
- FUEL SOL Fuel control solenoid valve
- GEN FILTER Generator oil filter clogged
  NOTE : GEN FILTER is applicable only up to ECB P/N 2117402-8.
- HOT SENSOR High oil temperature sensor
- IGN UNIT Ignition unit
- IGV ACT Inlet guide vane actuator
- LCIT SENSOR Load compressor inlet temperature sensor
- LD VAL SOL Bleed Load valve solenoid
- LOP SW Low oil pressure switch
- P2 SENSOR APU air inlet pressure sensor
- PT SENSOR Total pressure transducer at load compressor output
- STARTR CKT Starter circuit
- SURGE VALVE Surge control valve torque motor
- TST OK ECB self test checks OK
- WAIT ECB transfer delay
- DELTA P SENSOR Delta pressure transducer
- #1 SPD (RIGHT) NO. 1 motional transducer (speed sensor)
- #2 SPD (LEFT) NO. 2 motional transducer (speed sensor)
- #1 T/C RAKE EGT thermocouple right no. 1
- #2 T/C RAKE EGT thermocouple left no. 2

(7)Protective shutdown displays and associated possible faulty unit displays.

Protective Shutdown	Possible Fault Unit Displays
ECB	ECB
NO ACCEL	ECB FUEL CONTROL FUEL SOL IGV ACT DEOIL SOL
SLOW START	ECB APU STARTER STARTER CKT IGN UNIT FUEL CONTROL FUEL SOL IGV ACT DEOIL SOL
NO FLAME	ECB IGN UNIT FUEL CONTROL FUEL SOL DEOIL SOL
LOP	ECB
S/D CKT	ECB
GEN FILTER	GEN FILTER
NOTE : GEN FILTER is applicable only, up to ECB P/N 2117402-8.	
OVER TEMP	ECB
FAILED SENSOR	#1 & #2 SPD SENSORS #1 & #2 T/C RAKES LOP SW FAN VALVE

1. General

The APU exhaust system discharges both APU exhaust gas and load compressor surge bleed air out to the atmosphere, it is also designed to muffle the exhaust noise.

The exhaust gas and surge bleed air are discharged directly aft through the tail cone to prevent their ingestion into the APU air intake or ventilation openings of the APU compartment.

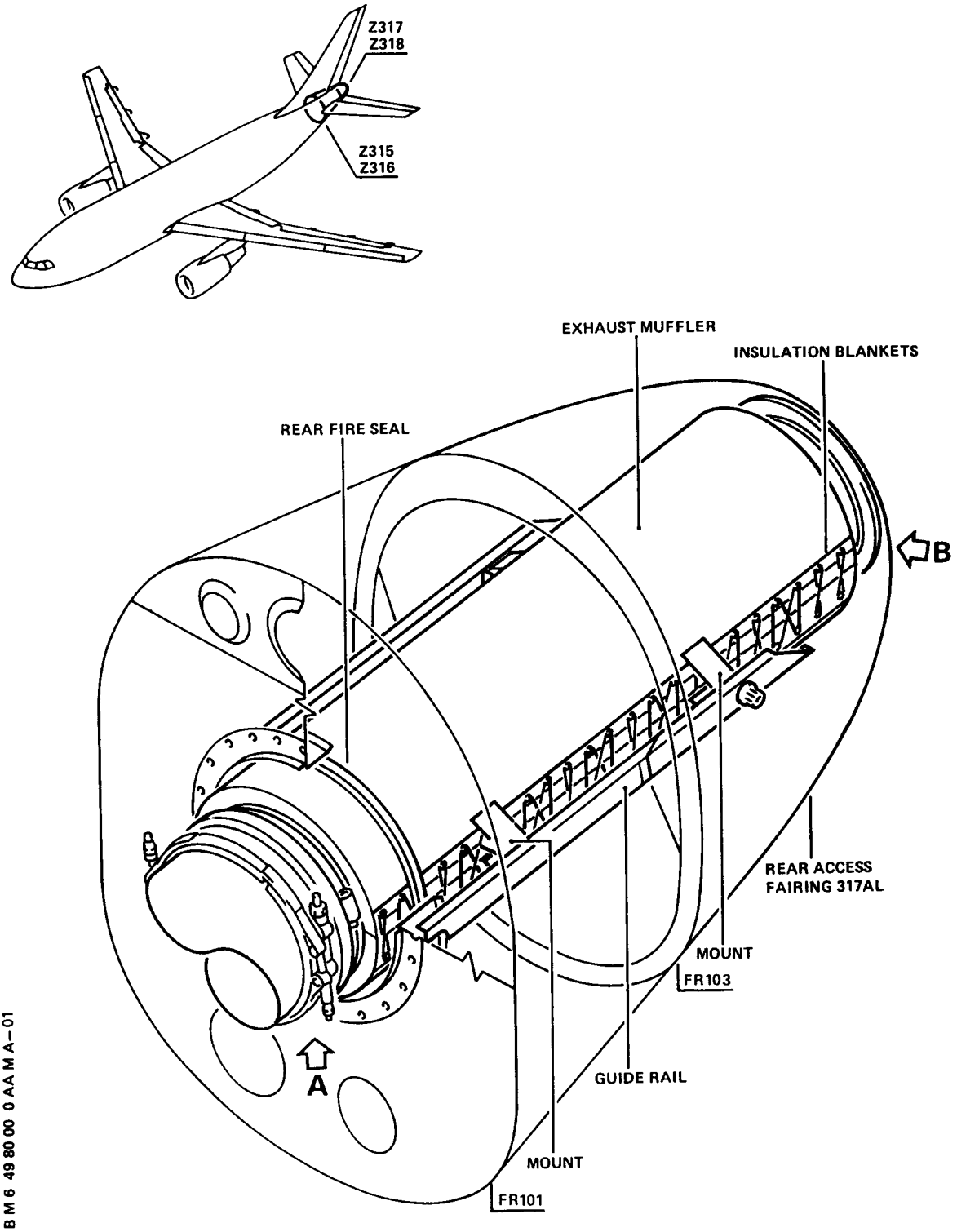
The exhaust system is situated in the tail cone from forward of APU compartment rear firewall FR101 to the end of the fuselage. The point where the exhaust muffler passes through the rear firewall at FR101 is designed to provide a sealed fireproof joint.

The system consists of the exhaust muffler, sealing ring coupling, rear fireseal, insulation blankets and rear access fairing seal.

2. Component Location

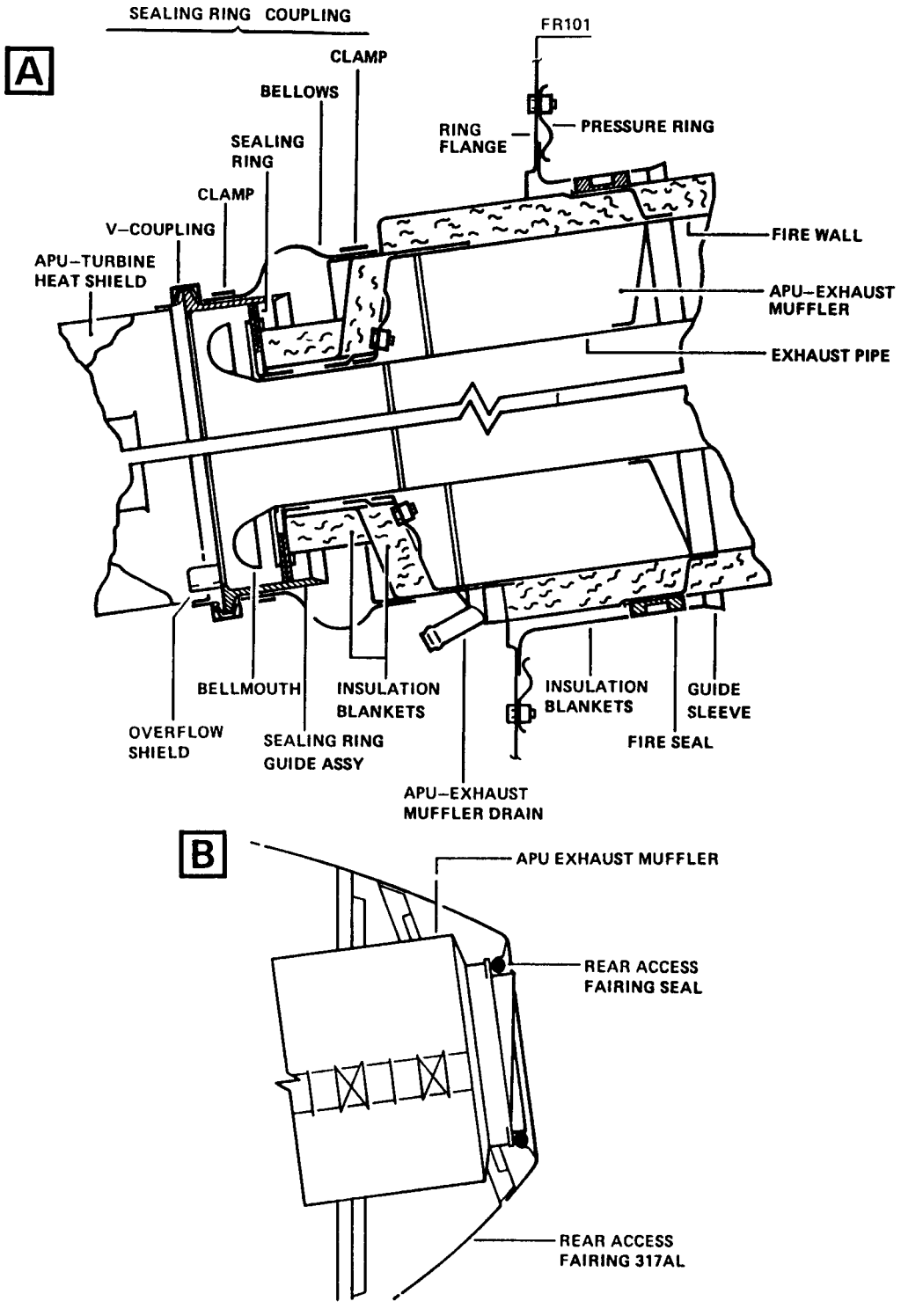
(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	EXHAUST MUFFLER AND SEALING RING COUPLING		315	315AL	49-81-15
			316	316AR	
			317	317AL	
			318	317AL	
	REAR FIRE SEAL		315	315AL	49-13-11
			316	316AR	
			317	317AL	
			318	317AL	
	INSULATION BLANKETS		317	317AL	
			318	317AL	



Exhaust System - Component Location (Sheet 1/2)
Figure 001

R



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Exhaust System - Component Location (Sheet 2/2)
Figure 001

R

3. Description

A. Exhaust Muffler
The exhaust muffler consists of the felt-metal inner exhaust pipe and the outer firewall. It has four mounts, which are inserted into the guide rails located in the tailcone structure and support the exhaust muffler. This design allows for expansion due to the high operating temperatures. To drain any fluid accumulation within it, a drain connector is situated at the lowest point of the exhaust muffler. The exhaust muffler is made from corrosion and heat resistant steel.

B. Sealing Ring Coupling
The sealing ring coupling provides a flexible connection of the exhaust muffler to the APU-turbine heat shield. It consists mainly of the sealing ring assy and the sealing ring guide assy and is enclosed within and shielded by a fire-resistant bellows. All parts are made from corrosion and heat resistant materials.

(1) The rear of the sealing ring assy is bolted to the exhaust muffler, the front formed as a bellmouth protrudes into the sealing ring guide assy. The sealing ring assy is covered with insulation blankets. Flexible sealing between guide assy and bellmouth is provided by the sealing ring and the fire-resistant bellows.

(2) The sealing ring guide assy front flange is connected to the APU-turbine heat shield flange by means of a V-coupling. An overflow shield at the lower front channels drain fluid from the sealing ring coupling into the turbine heatshield for draining via the heat shield drain.

C. Rear Fireseal (Ref. 49-13-00, P. Block 1).

D. Insulation Blankets
The hot skin of the exhaust muffler is shielded by upper and lower insulation blankets. Thus the surface temperature of the exhaust system is limited to 260° C (500° F) at an ambient temperature of 50° C (122° F). The insulation blankets consist of 3 layers of insulation material which are enclosed within a stainless steel jacket. The upper and lower blankets are held together using wire lacing.

E. Rear Access Fairing Sealing
The point at which the exhaust pipe passes through the end structure of rear access fairing 317AL is sealed by a fireproof flexible sealing. This prevents any reverse flow of exhaust gas into the rear access fairing.

EXHAUST MUFFLER AND SEALING RING - REMOVAL/INSTALLATION

WARNING : ALLOW APU AND EXHAUST MUFFLER TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
CAUTION : MAKE CERTAIN THAT THE REAR FIREWALL IS NOT DISTORTED OR UNDER TENSION DURING REMOVAL OR INSTALLATION OF EXHAUST MUFFLER.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Torque Wrench, up to 0.5 m.daN. (44 lbf.in.)
D.	Torque Wrench, up to 1.0 m.daN. (88 lbf.in.)
E.	Torque Wrench, up to 4.0 m.daN. (30 lbf.ft.)
F. 98A49807613000	Handles Extractor, APU Exhaust
G.	Corrosion-Resistant Steel Lockwire, 0.032 in. (0.8 mm) dia.
H. Material No. 05-027	Special Materials (Ref. 20-31-00)

Referenced Procedures

- 49-13-11, P. Block 401	Rear Fire Seal
- 51-75-10, P. Block 801	Repair of Paint Coatings

2. Procedure

R **ON A/C 001-005,

(Ref. Fig. 401, 402)

R **ON A/C 006-200,

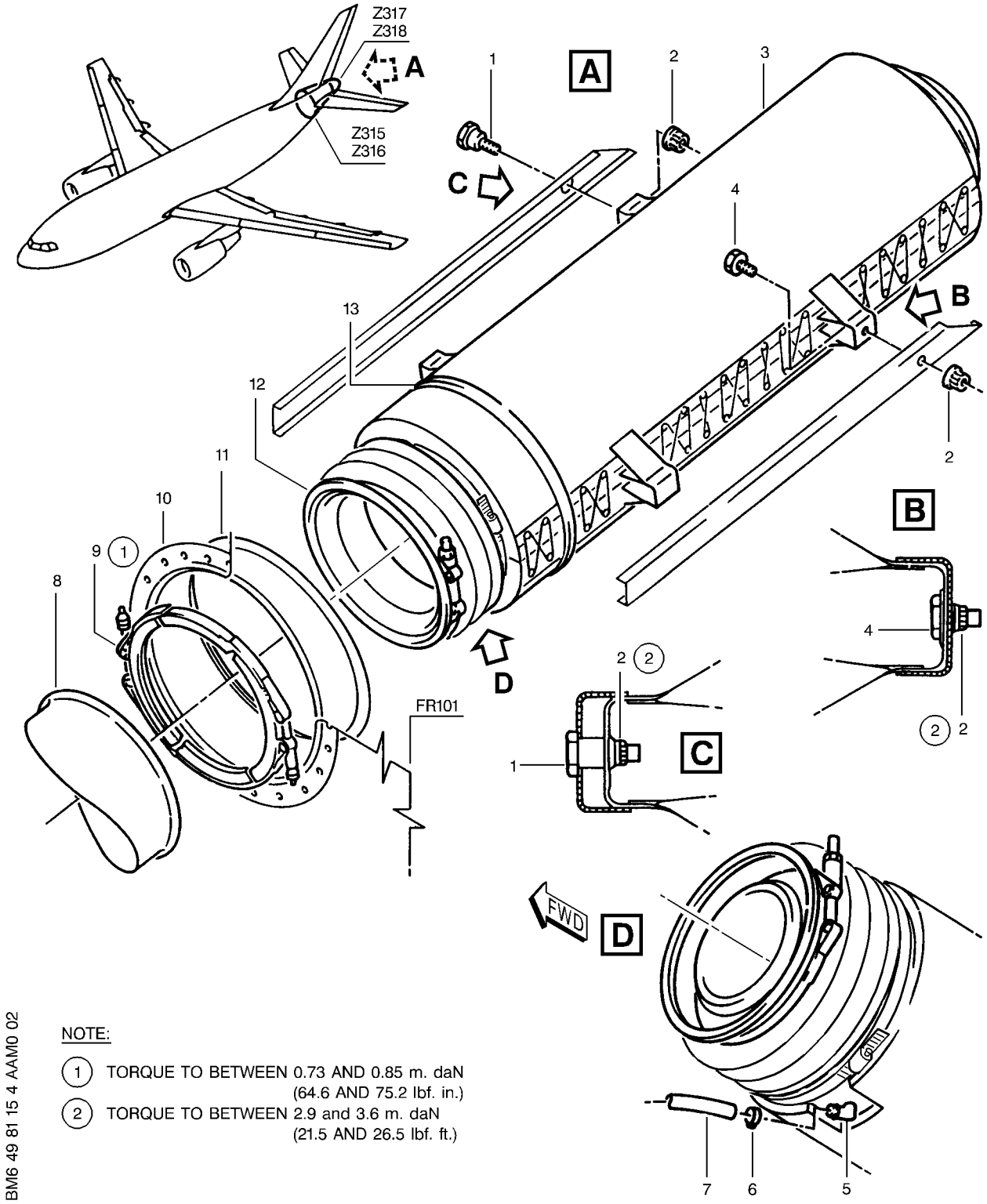
R (Ref. Fig. 403, 404)

R **ON A/C ALL

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

R **ON A/C 001-005,



NOTE:

(1) TORQUE TO BETWEEN 0.73 AND 0.85 m. daN (64.6 AND 75.2 lbf. in.)

(2) TORQUE TO BETWEEN 2.9 and 3.6 m. daN (21.5 AND 26.5 lbf. ft.)

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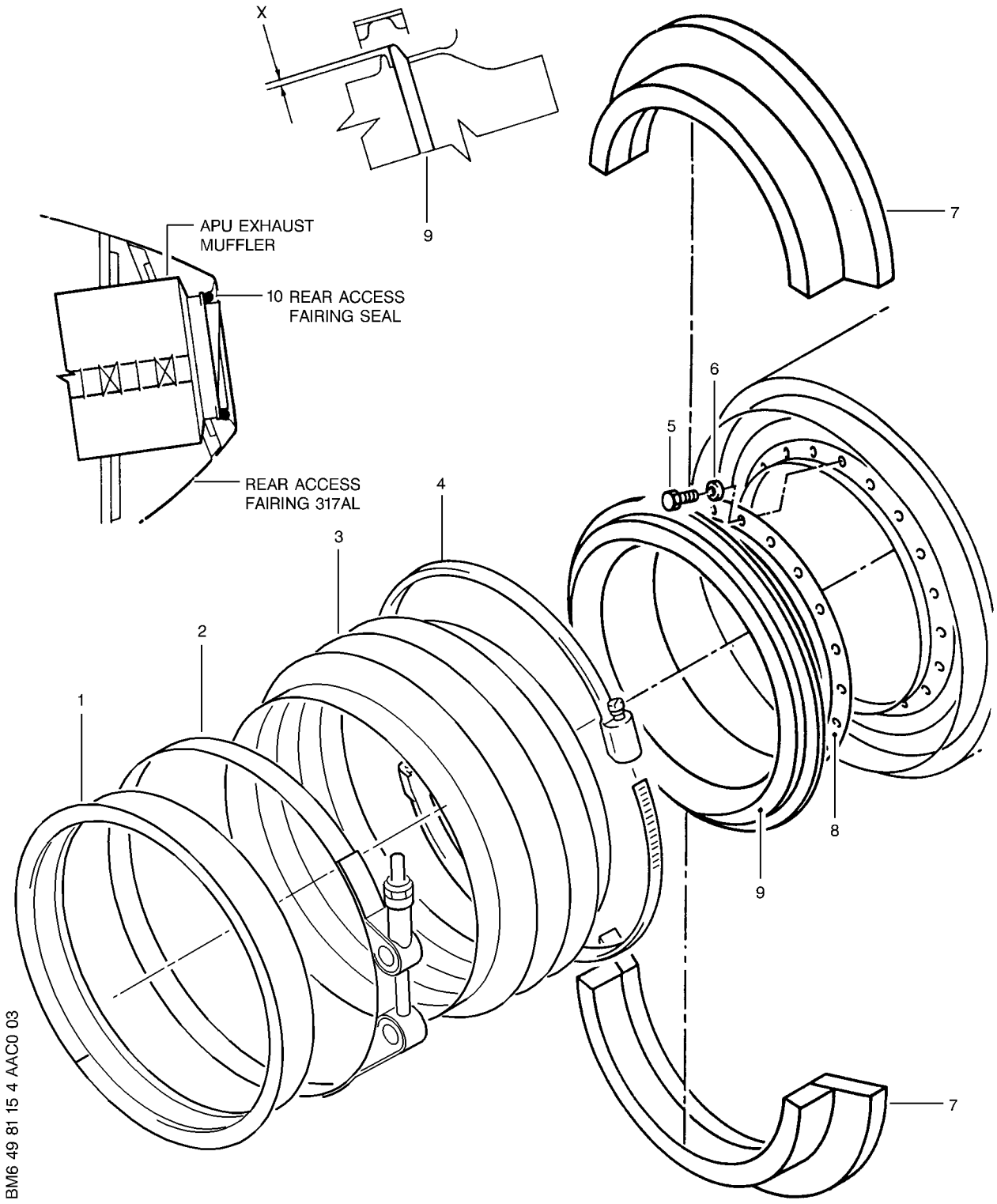
Exhaust Muffler
Figure 401

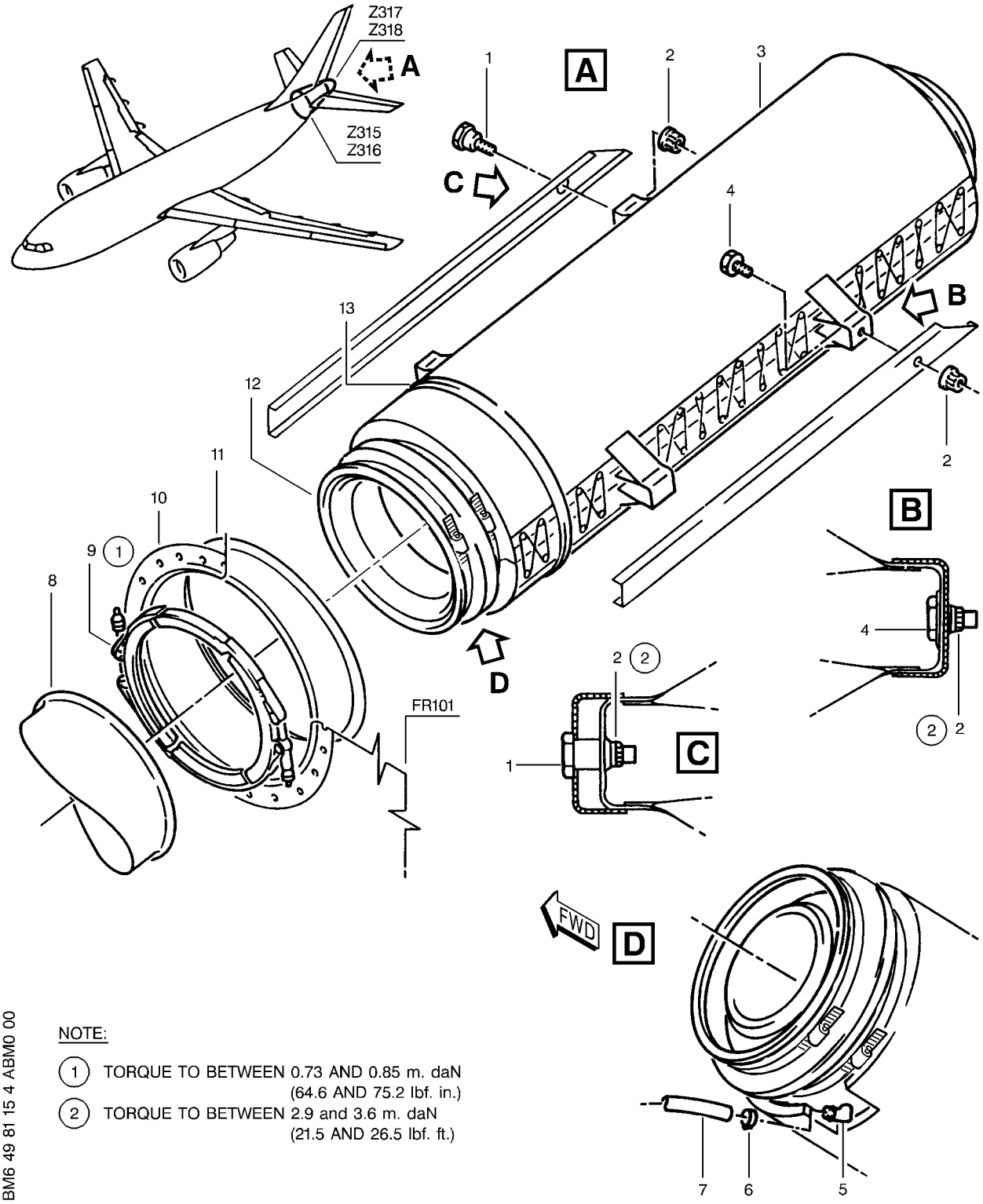
R

R EFFECTIVITY: 001-005,

PIA



Exhaust Muffler and Sealing Ring
Figure 402



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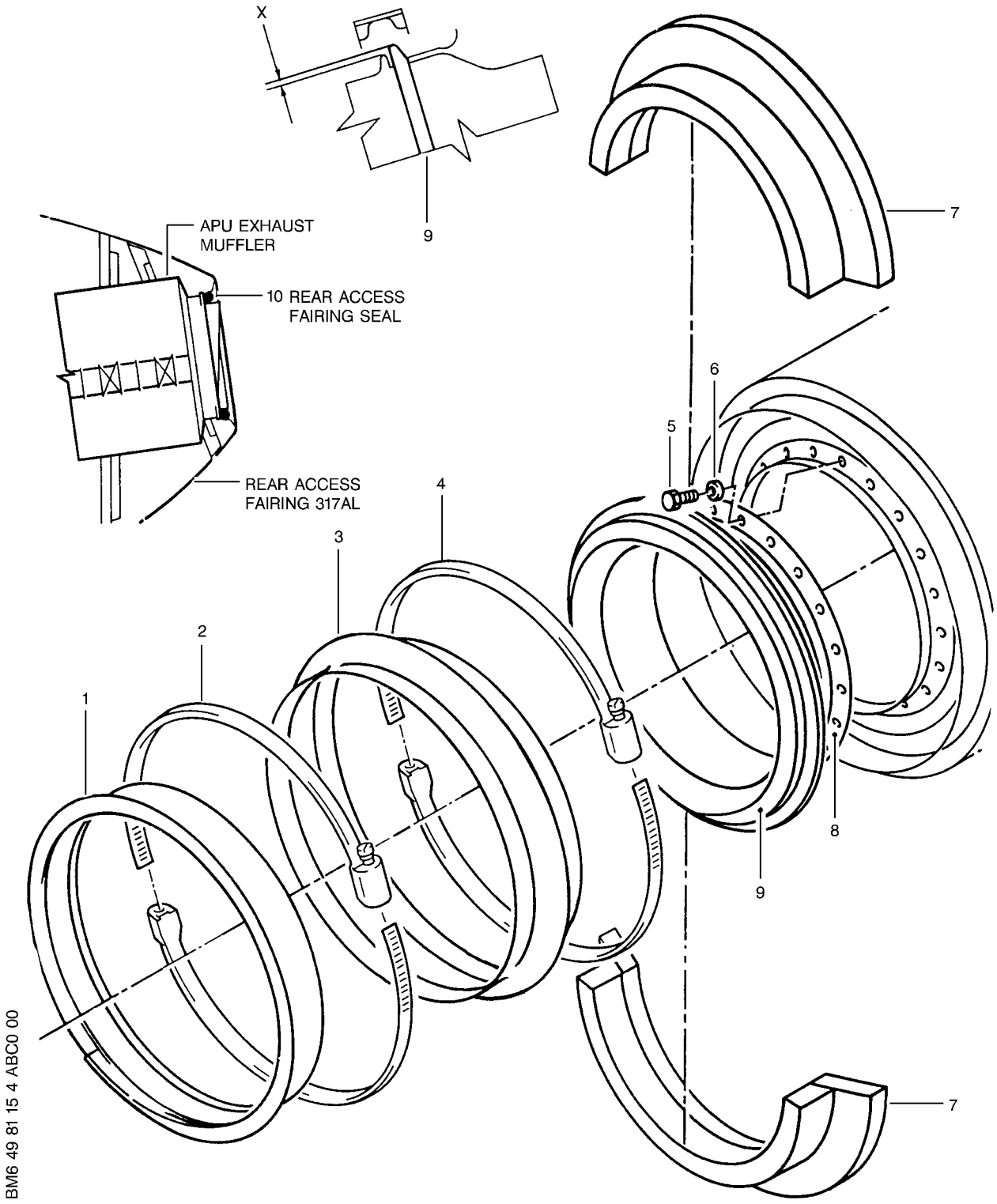
NOTE:

(1) TORQUE TO BETWEEN 0.73 AND 0.85 m. daN (64.6 AND 75.2 lbf. in.)

(2) TORQUE TO BETWEEN 2.9 and 3.6 m. daN (21.5 AND 26.5 lbf. ft.)

R Exhaust Muffler
Figure 403



Exhaust Muffler and Sealing Ring
Figure 404

R

(2)Position access platform and open access doors 315AL, 316AR and rear access fairing 317AL.

B. Removal

(1)Removal of Exhaust Muffler (Ref. Fig. 401)

(a)Release clamp (6) and disconnect drain line (7) from exhaust muffler drain connection (5).

(b)Release coupling (9).

(c)Push sealing ring guide assy (12) rearwards to separate flanges of guide assy (12) and APU turbine heat shield (8).

(d)Remove coupling (9).

(e)Remove nuts (2) and bolts (1,4) that secures muffler in guide rail.

CAUTION : MAKE CERTAIN THAT THE REAR FIREWALL IS NOT DISTORTED OR UNDER TENSION DURING REMOVAL OF EXHAUST MUFFLER.

(f)Using APU exhaust extractor handles pull exhaust muffler (3) from installed position and remove from aircraft.

(2)Removal of Sealing Ring (Ref. Fig. 402)

(a)Cut and remove lockwire and release clamps (2,4).

(b)Remove sealing ring guide (1) and bellows (3).

(c)Cut and remove lockwire and remove insulation blankets (7).

(d)Remove bolts (5), washers (6) sealing ring (9) and seal (8).

C. Preparation for Installation

(1)Inspect rear fire seal sleeve (11) for damage, replace if necessary (Ref. 49-13-11, P. Block 401).

(2)Inspect fire seal (13), exhaust muffler (3) and insulation blankets for damage, replace if necessary.

(3)Inspect sealing ring guide assembly (1), bellows (3), sealing ring (9) and seal (8) for damage, replace if necessary.

(4)Inspect rear access fairing seal (10) for damage, replace if necessary.

D. Installation

(1)Installation of Sealing Ring (Ref. Fig. 402)

(a)Position seal (8), sealing ring (9), and install washers (6) and bolts (5).

(b)Position bellows (3), clamp (4) and tighten.

(c)Position sealing ring guide (1) in bellows (3).

NOTE : Drain overflow shield must be located in six o'clock position.

(d)Install clamp (2) and TORQUE to between 0.09 and 0.11 m.daN (7.9 and 9.7 lbf.in).

(e)Safety clamps (2,4) with lockwire.

(f)Position insulation blankets (7) and secure with lockwire.

(2)Installation of Exhaust Muffler (Ref. Fig. 401)

(a)Position exhaust muffler (3) in guide rails.

CAUTION : MAKE CERTAIN THAT THE REAR FIREWALL IS NOT DISTORTED OR UNDER TENSION WHEN INSTALLING EXHAUST MUFFLER

(b)Push exhaust muffler (3) forward and carefully slide exhaust muffler fireseal (13) into rear fireseal sleeve (11).

(c)Install bolts (1,4) and nuts (2) to secure muffler in guide rails, do not tighten at this time.

(d)Position coupling (9) loosely on turbine heat shield flange (8).

(e)Push sealing ring assy forward until a uniform contact is made between flanges of turbine heat shield (8) and sealing ring guide assy (12).

NOTE : Make certain that the flanges of the sealing ring guide assembly and turbine heat shield are concentric to within 2.00 mm. of each other before fitting coupling ((Dimension X) (Ref. Fig. 402)).

(f)Install coupling (9) with coupling locks in 3 and 9 o'clock positions.

(g)TORQUE coupling (9) to between 0.73 and 0.85 m.daN (64.6 and 75.2 lbf.in.).

(h)TORQUE nuts (2) to between 2.9 and 3.6 m.daN. (21.5 and 26.5 lbf.ft.).

(j)Connect drainline (7) to exhaust muffler drain connection (5) and install clamp (6).

(k)Thinly apply moisture-removing oil (Mat. No. 05-027) to exhaust muffler attachments (Ref. 51-75-10, P. Block 801).

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close rear access fairing 317AL and access doors 316AR and 315AL. Remove access platform.

R **ON A/C 006-200,

(2)Position access platform and open access doors 315AL, 316AR and rear access fairing 317AL.

B. Removal

R (1)Removal of Exhaust Muffler (Ref. Fig. 403)
(a)Release clamp (6) and disconnect drain line (7) from exhaust muffler drain connection (5).
(b)Release coupling (9).
(c)Push sealing ring guide assy (12) rearwards to separate flanges of guide assy (12) and APU turbine heat shield (8).
(d)Remove coupling (9).
(e)Remove nuts (2) and bolts (1,4) that secures muffler in guide rail.
CAUTION : MAKE CERTAIN THAT THE REAR FIREWALL IS NOT DISTORTED OR UNDER TENSION DURING REMOVAL OF EXHAUST MUFFLER.
(f)Using APU exhaust extractor handles pull exhaust muffler (3) from installed position and remove from aircraft.

R (2)Removal of Sealing Ring (Ref. Fig. 404)
(a)Cut and remove lockwire and release clamps (2,4).
(b)Remove sealing ring guide (1) and bellows (3).
(c)Cut and remove lockwire and remove insulation blankets (7).
(d)Remove bolts (5), washers (6) sealing ring (9) and seal (8).

C. Preparation for Installation
(1)Inspect rear fire seal sleeve (11) for damage, replace if necessary (Ref. 49-13-11, P. Block 401).
(2)Inspect fire seal (13), exhaust muffler (3) and insulation blankets for damage, replace if necessary.
(3)Inspect sealing ring guide assembly (1), bellows (3), sealing ring (9) and seal (8) for damage, replace if necessary.
(4)Inspect rear access fairing seal (10) for damage, replace if necessary.

D. Installation

R (1)Installation of Sealing Ring (Ref. Fig. 404)
(a)Position seal (8), sealing ring (9), and install washers (6) and bolts (5).
R (b)Position bellows (3), clamp (4) and tighten. TORQUE clamp (4) to
R between 0.09 and 0.11 m.daN (7.9 and 9.7 lbf.in.).
(c)Position sealing ring guide (1) in bellows (3).
NOTE : Drain overflow shield must be located in six o'clock position.
(d)Install clamp (2) and TORQUE to between 0.09 and 0.11 m.daN (7.9 and 9.7 lbf.in).
(e)Safety clamps (2,4) with lockwire.
(f)Position insulation blankets (7) and secure with lockwire.

R (2)Installation of Exhaust Muffler (Ref. Fig. 403)
(a)Position exhaust muffler (3) in guide rails.
CAUTION : MAKE CERTAIN THAT THE REAR FIREWALL IS NOT DISTORTED OR UNDER TENSION WHEN INSTALLING EXHAUST MUFFLER
(b)Push exhaust muffler (3) forward and carefully slide exhaust muffler fireseal (13) into rear fireseal sleeve (11).
(c)Install bolts (1,4) and nuts (2) to secure muffler in guide rails, do not tighten at this time.
(d)Position coupling (9) loosely on turbine heat shield flange (8).
(e)Push sealing ring assy forward until a uniform contact is made between flanges of turbine heat shield (8) and sealing ring guide assy (12).
NOTE : Make certain that the flanges of the sealing ring guide assembly and turbine heat shield are concentric to within 2.00 mm. of each other before fitting coupling ((Dimension X)
R (Ref. Fig. 404)).
(f)Install coupling (9) with coupling locks in 3 and 9 o'clock positions.
(g)TORQUE coupling (9) to between 0.73 and 0.85 m.daN (64.6 and 75.2 lbf.in.).
(h)TORQUE nuts (2) to between 2.9 and 3.6 m.daN. (21.5 and 26.5 lbf.ft.).
(j)Connect drainline (7) to exhaust muffler drain connection (5) and install clamp (6).
(k)Thinly apply moisture-removing oil (Mat. No. 05-027) to exhaust muffler attachments (Ref. 51-75-10, P. Block 801).

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close rear access fairing 317AL and access doors 316AR and 315AL. Remove access platform.

R **ON A/C ALL

(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

EXHAUST MUFFLER AND BELLOWS - INSPECTION/CHECK

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Reason for the Job

R A. Detailed inspection of the muffler and bellows.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
Referenced Procedure - 49-81-15, P. Block 401	Exhaust Muffler and Sealing Ring

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

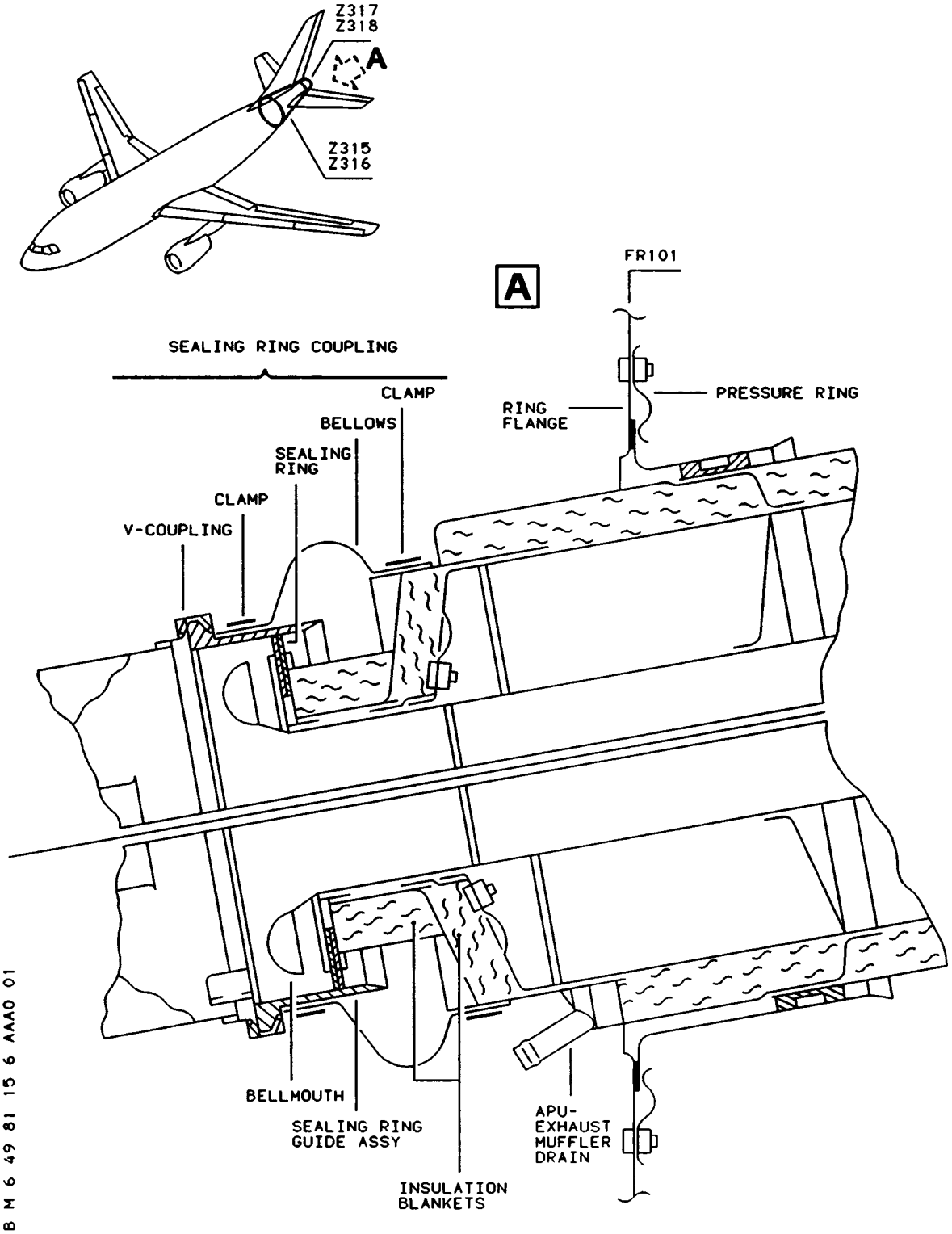
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/CTL	71KD	B53

(2)Position access platform and open access doors 315AL and 316AR.

B. Inspection
(Ref. Fig. 601)
(Ref. Fig. 602)
(1)Visually inspect the bellows for cracks, splits, delamination, overheating or brittleness.
(2)Make certain that the bellows are correctly attached at both ends.
(3)Bellow cuffs that have slipped from under the clamps must be repositioned (Ref. 49-81-15, P. Block 401).
(4)Cracks or splits greater than half the circumference of the bellows 622 mm (24.41 in.) are not permitted.

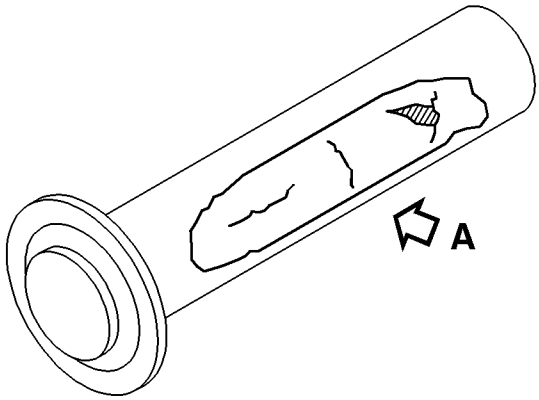
NOTE : The dimensions given in step (4) above are only applicable to the old type multi convoluted bellows.
Any holes, cracks or splits at the new type of bellows are not permitted.

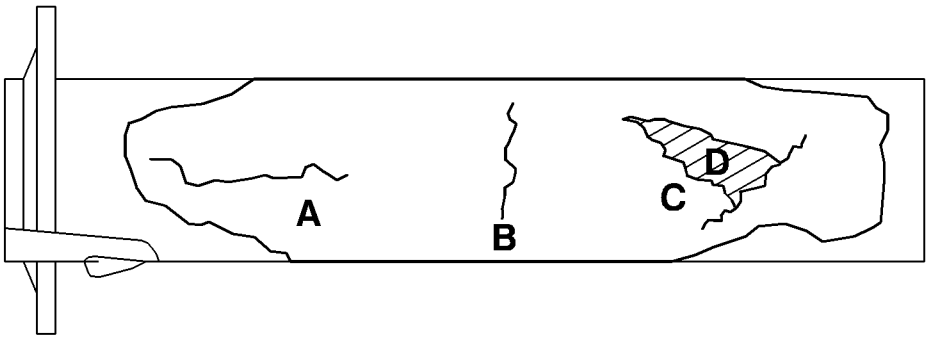
(1)Visually inspect muffler feltmetal for cracks and other damage.



Exhaust Muffler Bellows
Figure 601

R





CUTAWAY TO SHOW TYPICAL CRACKING

A. MAX LENGTH 150mm. (6").
B. MAX LENGTH 20% OF CIRCUMFERENCE.
C. MAX LENGTH 150mm. (6") IN ANY DIRECTION.
D. MAX AREA 32 square cms (5 square ").
   MAX ACCUMULATIVE AREA 33% (1/3 rd.) OF MUFFLER.

BM6 49 81 15 6 AACO 00

R

Exhaust Muffler Damage Limits
Figure 602

R NOTE: It is not recommended to operate the APU when the exhaust
R feltmetal muffler is damaged. For this condition, please
R contact Airbus for APU operation.

(2)Make certain any cracks or damage found are within the following limits:
(3)Mufflers with cracks or damage outside the following limits must be replaced (Ref. 49-81-15, P. Block 401).

Cracks in the longitudinal direction:
Maximum length 150 mm (6 in.).
No limit on number of cracks, each counted individually.
No limit on spacing between each crack.
Mufflers with cracks exceeding these limits must be replaced at next A check or not later than three months.

Cracks in circumferential direction:
Maximum length allowed, up to 20 per cent of circumference without restriction in operation.
No limit on number of cracks, each counted individually.
No limit on spacing between each crack.
Mufflers with cracks in length, exceeding 20 per cent of the circumference must be replaced at next A check or not later than three months.

Cracks that intersect:
Maximum length 150 mm (6 in.) of any single crack, in any one direction.
All loose parts must be removed.
Multiple intersections are allowable.

Holes in muffler:
Holes are allowed up to 32 square cm (5 square in.) and an accumulated total area of 33 per cent (1/3rd) of the muffler.
Mufflers with damage exceeding these limits must be replaced at next A check or not later than three months.

C. Close-Up
(1)Make certain that the working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD and 71KD.

OIL SYSTEM - DESCRIPTION AND OPERATION

1. General

The APU oil system provides lubrication and cooling to the APU modules, which are power section, load compressor and gearbox with accessories, as well as to the oil cooled auxiliary AC generator.

The APU oil system is a wet sump design with an internal and external system and a monitoring/indication system.

The internal system consists of the oil reservoir, which is integrated in the gearbox, the oil pump assembly with oil filter element, magnetic drain plug, generator scavenge pump with oil filter element, turbine bearing scavenge pump, the normally closed (NC) solenoid valve (de-oil) and several valves.

The external system is the oil cooler with attached thermal bypass valve and required tubing.

The monitoring/indication system includes the remote oil level indication with an indicator on the APU maintenance panel 472VU and high oil temperature/low oil pressure monitoring.

High oil temperature/low oil pressure parameters are monitored by and, in case of fault, indicated on the Electronic Control Box (ECB) 59KD.

An APU auto shutdown occurs in case of high oil temperature/low oil pressure and is indicated on the LH ECAM display unit.

The ECB also gives a fault signal to the FAULT light on the APU overhead panel 429VU and to the MASTER CAUTION lights.

2. Component Location
(Ref. Fig. 001)

R **ON A/C 001-100,

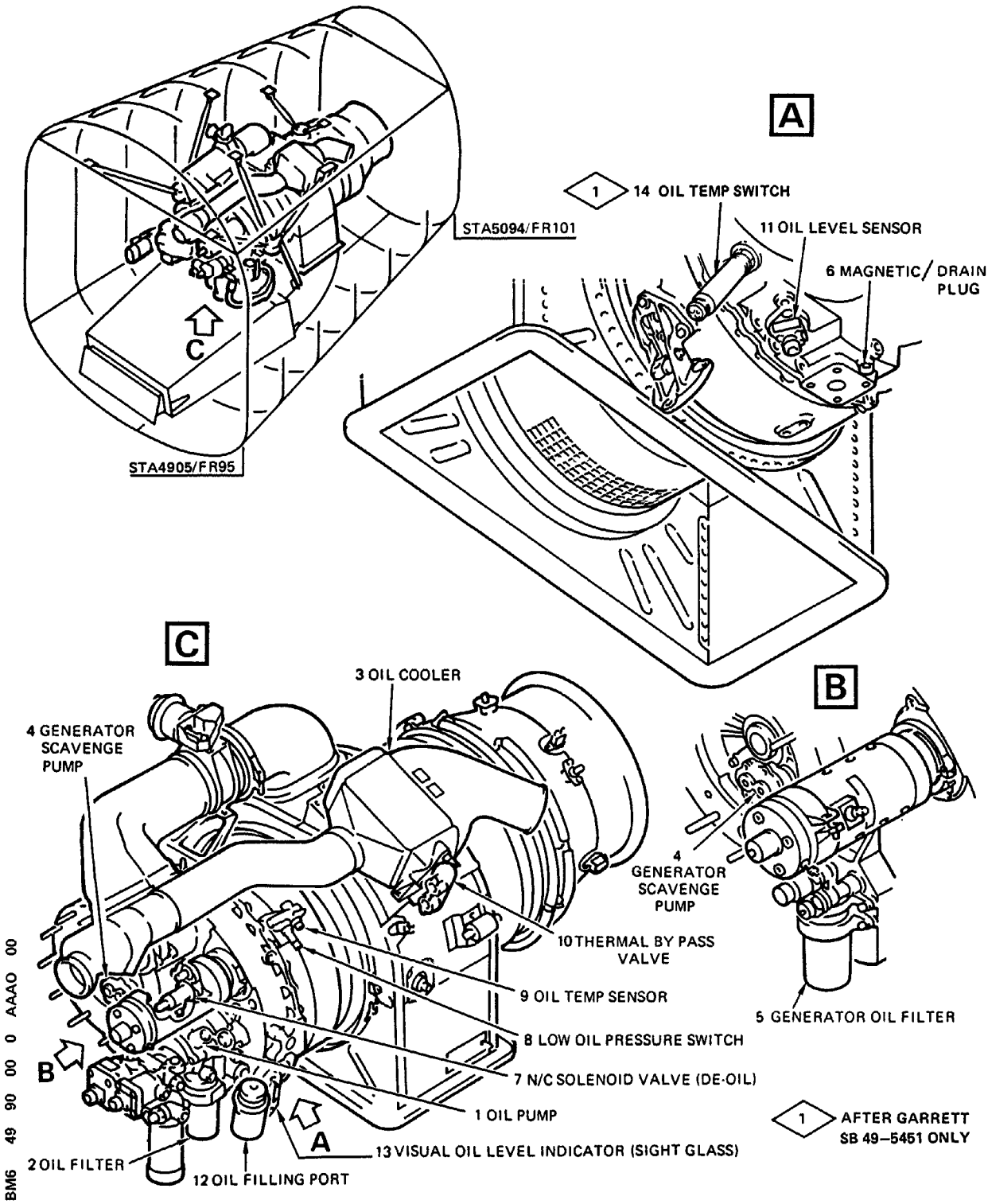
(Ref. Fig. 002)

R **ON A/C 101-200,

(Ref. Fig. 003)

R **ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	OIL PUMP		315	315AL, 316AR	49-91-16
	OIL FILTER		315	315AL, 316AR	49-91-12
	OIL COOLER		315	315AL, 316AR	49-91-15
	GENERATOR SCAVENGE PUMP		316	315AL, 316AR	49-91-16
	GENERATOR OIL FILTER		315, 316	315AL, 316AR	49-91-12
	MAGNETIC/DRAIN PLUG		315, 316	315AL, 316AR	49-91-13
	N/C SOLENOID VALVE (DE-OIL)		315	315AL, 316AR	49-91-17
	LOW OIL PRESSURE SWITCH		315	315AL, 316AR	49-94-11
	OIL TEMP SENSOR		315	315AL, 316AR	49-94-12
** AFTER GARRETT SB GTCP331-49-5451					
	OIL TEMP SWITCH		316	315AL 316AR	49-94-13
** ON A/C ALL					
	OIL COOLER THERMAL BY-PASS VALVE		315	315AL, 316AR	49-91-18
	OIL QUANTITY SENSOR		316	315AL, 316AR	49-93-16
	OIL FILLING PORT		315	315AL, 316AR	49-93-13
	VISUAL OIL LEVEL INDICATOR (SIGHT GLASS)		315	315AL, 316AR	49-93-13
59KD	ELECTRONIC CONTROL BOX		251	251JC	49-61-11



Oil System - Component Location
Figure 001

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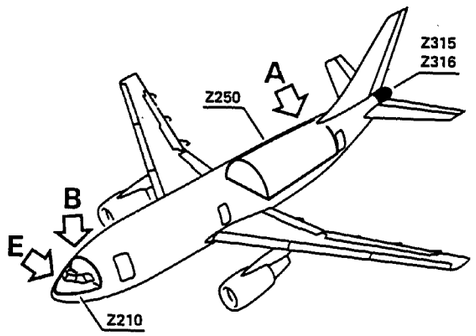
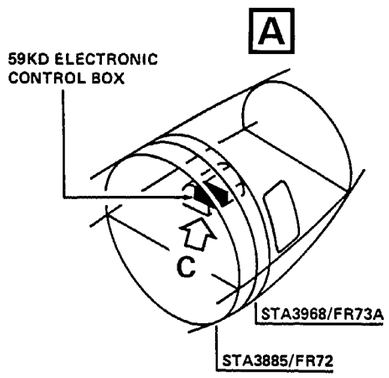
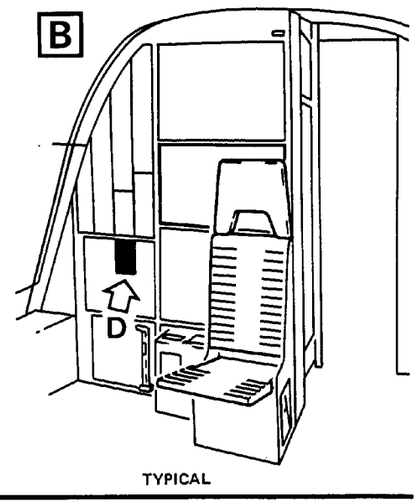
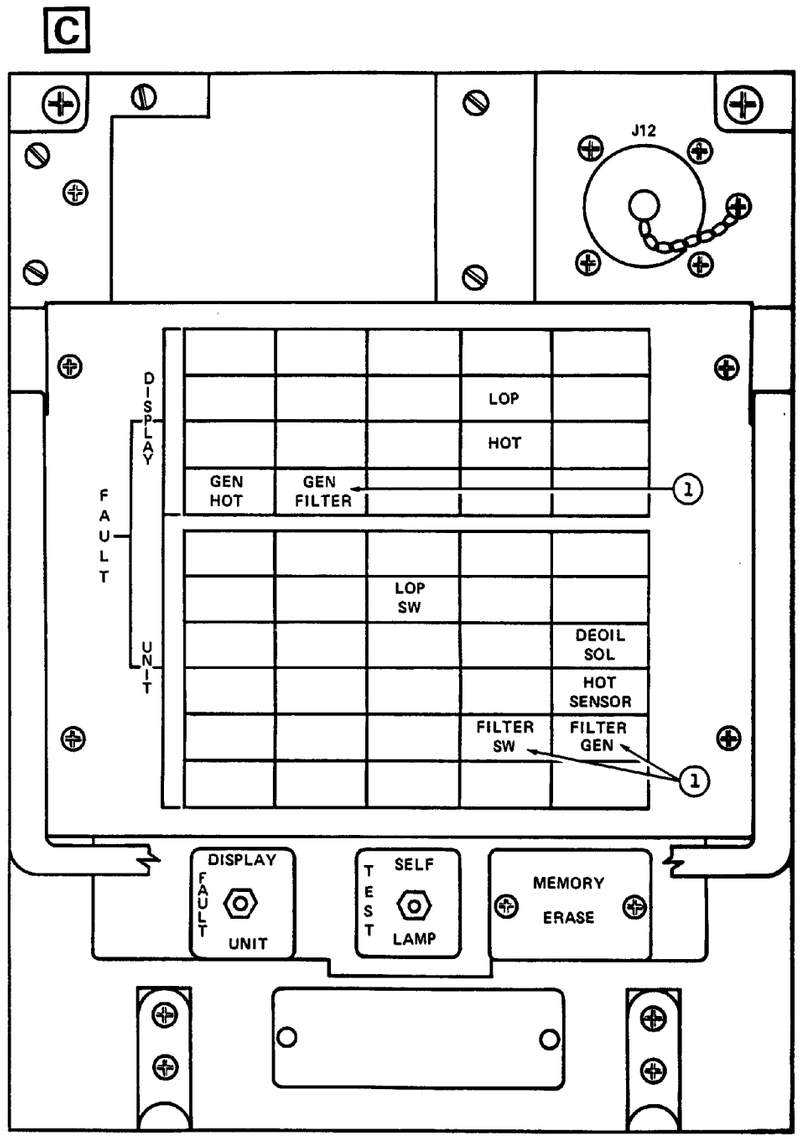




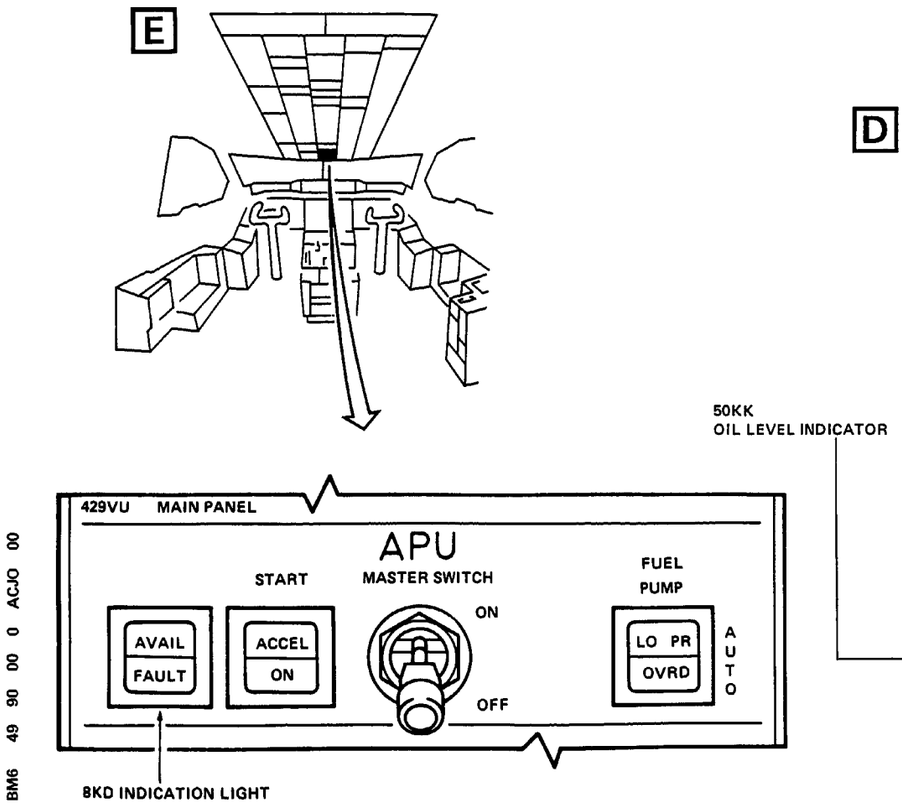


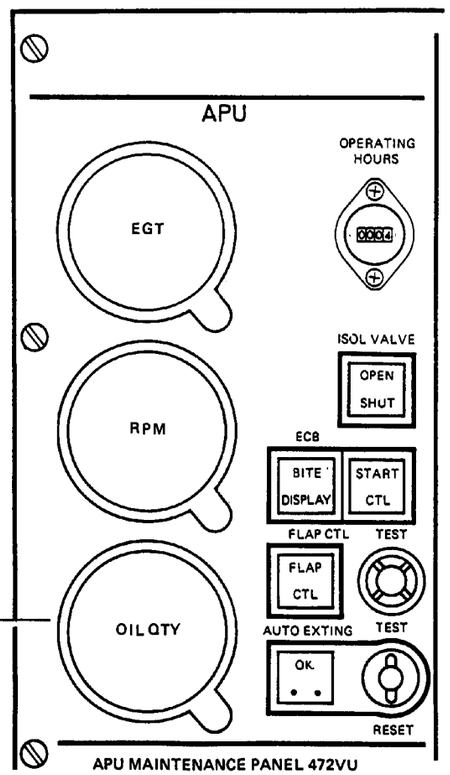
TYPICAL



ECB FRONT PANEL
POSSIBLE FAULT ILLUMINATION
FOR OIL SYSTEM

(1) NOT APPLICABLE FOR ECB
P/N 211 7402–9 AND SUBSEQUENT

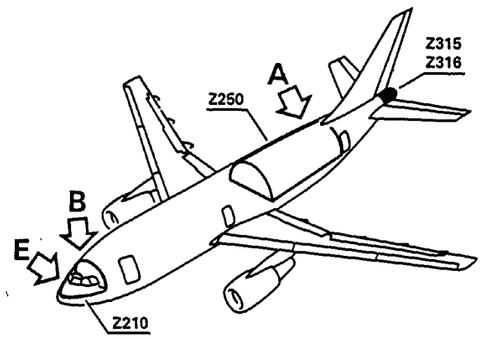


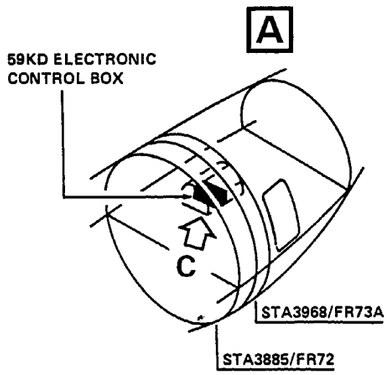


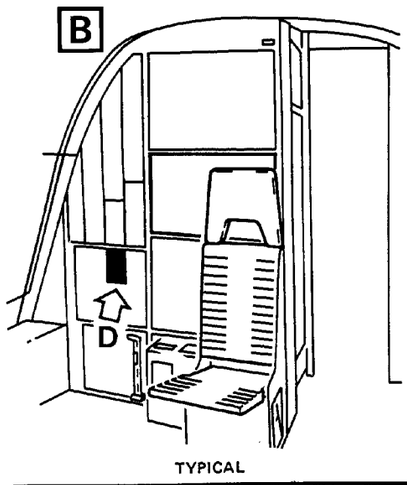
APU MAINTENANCE PANEL 472VU

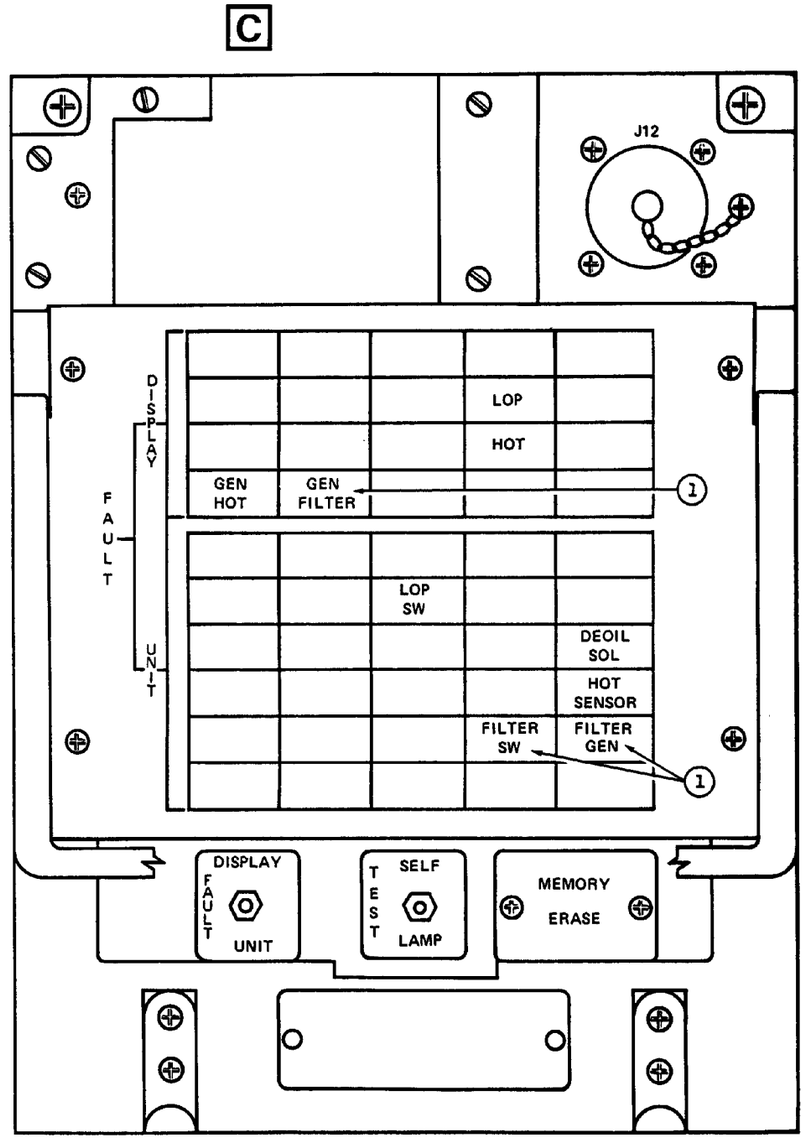
BM6 49 90 00 0 ACJO 00

Oil System - Monitoring/Indication
Figure 002

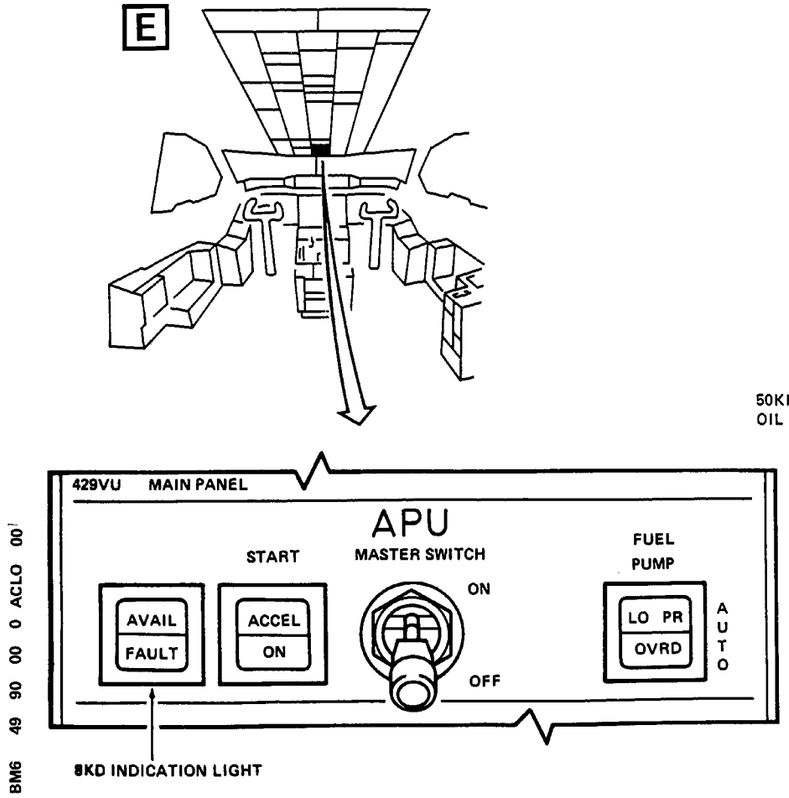


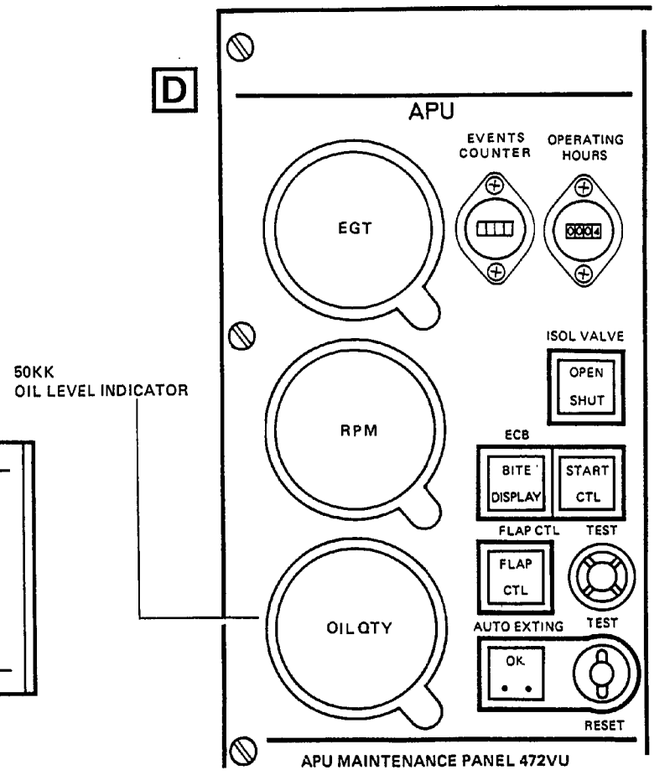






ECB FRONT PANEL
POSSIBLE FAULT ILLUMINATION
FOR OIL SYSTEM





1 NOT APPLICABLE FOR ECB
P/N 211 7402–9 AND SUBSEQUENT

Oil System - Monitoring/Indication
Figure 003

3. Description

A. Gearbox sump
The bottom of the gearbox is the integrated oil reservoir of the APU wet sump lubrication system with a 6 US quart (5.68 l) oil capacity.
Oil servicing is accomplished by means of a gravity fill port or pressure filling and overfill ports. A sight glass is provided on the side of the gearbox for visual oil level reading, and an oil quantity sensor is provided for remote indication.

B. Oil pump (Ref. 49-19-16, P. Block 401)
The oil pump is used to supply lubricating oil under pressure to the engine gears, bearings and accessories, then return the oil to the gearcase.
The oil pump is a two element (one pressure, one scavenge) positive displacement gear pump. The oil pump contains the pressure pump, scavenge pump, filter element, oil pressure relief valve, oil pressure regulating valve, differential pressure indicator and provisions for mounting the fuel control unit.

C. Oil cooler (Ref. 49-91-15, P. Block 201)
The oil cooler is an air to oil heat exchanger with air flow supplied by the gearbox mounted cooling fan. An oil pressure relief valve is installed on the oil pump to protect the cooler from excessive pressure.
The oil cooler thermal bypass valve is mounted on the oil cooler.

D. Generator scavenge pump (Ref. 49-91-16, P. Block 401)
The oil cooled generator system includes the generator scavenge pump and a filter assembly consisting of an oil filter element, generator filter differential pressure switch and differential pressure indicator.

E. Magnetic drain plug (Ref. 49-91-13, P. Block 201)
The magnetic drain plug is located in the gearbox oil reservoir. The magnetic drain plug contains a magnetic chip detector, and a check valve to permit a magnetic element check without the loss of oil.

F. De-oil solenoid valve (Ref. 49-91-17, P. Block 401)
The de-oil solenoid valve is provided in the APU lubrication system to facilitate APU starting after cold soak conditions. It allows air to flow into the oil pump to unload the pump.

4. Operation

(Ref. Fig. 004)

Supply oil is pumped from the gearbox by the pressure pump, then through the oil cooler and filter to the engine for lubrication. Scavenged oil is pumped from the engine by the scavenge pump back to the gearcase.

During APU operation, oil is drawn by the pressure pump of the oil pump from the gearbox oil reservoir via the lube pump inlet. All oil flows through the oil cooler and filter element before being delivered to the generator and the various engine and gearbox oil jets and orifices. The oil cooler mounted thermal bypass valve begins to close when the oil temperature reaches 60 °C (140 °F), at 77 °C (170 °F) the valve is fully closed causing all oil to flow through the oil cooler.

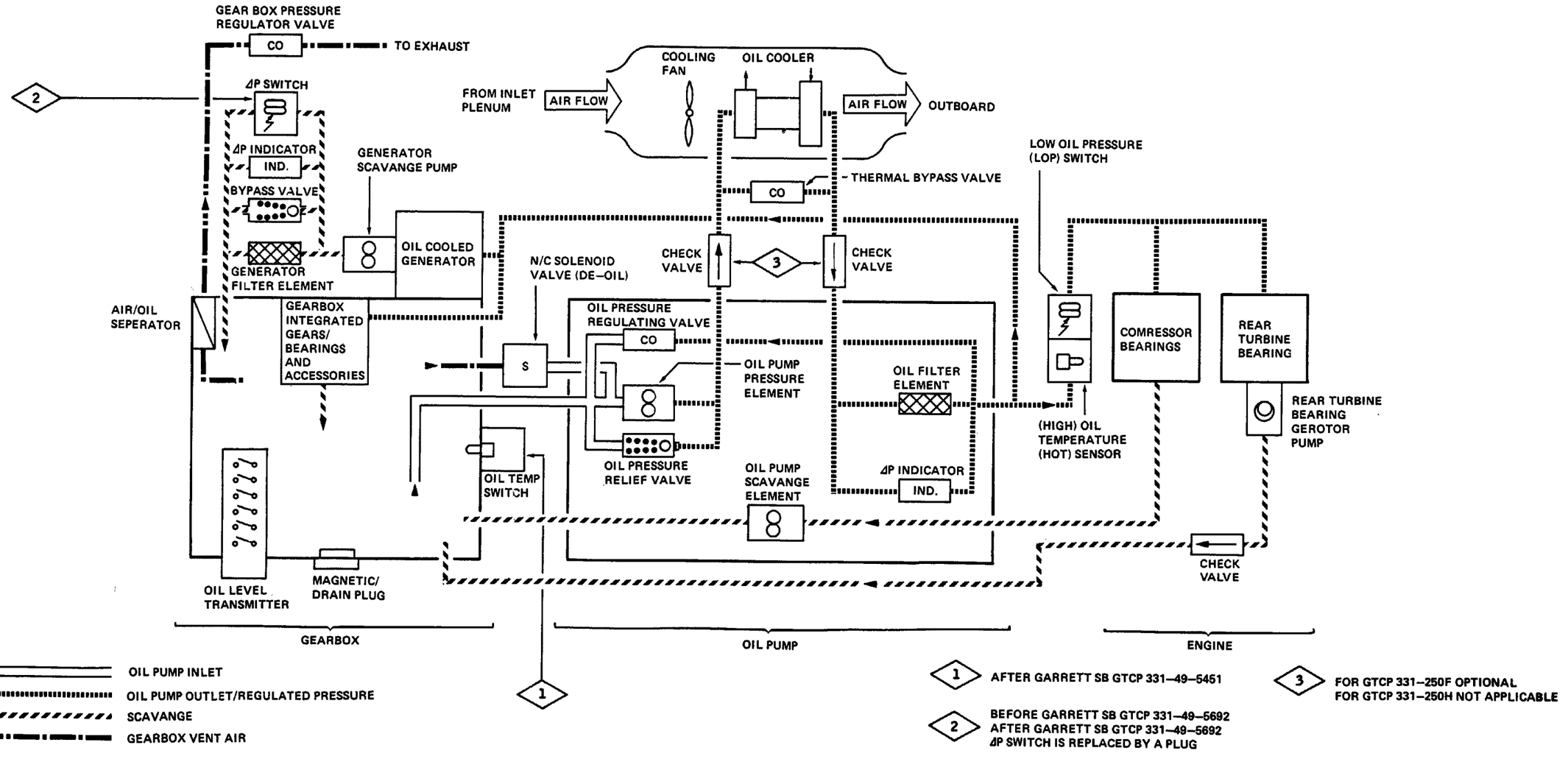
The 65 psig oil pressure regulating valve located downstream of the oil cooler and filter element is contained within the oil pump and is externally removable for ease of access and maintainability. Oil from the generator is returned to the sump by way of the generator filter by means of generator scavenge pump. Oil from the gearbox starter clutch, bearings and gears is returned to the gearbox oil reservoir by force of gravity. Oil from the engine midframe bearing is returned to the gearbox oil reservoir by a scavenge pump mounted in tandem with the pressure pump. Oil from the engine rear bearing is scavenged by a small pump contained within the bearing cavity and is pumped directly back to the gearbox oil reservoir.

The gearbox is vented to the exhaust by an air-oil separator providing separation of entrapped oil from the air. The separation is accomplished by forcing the air-oil mixture to flow inside a shaft, rotating with sufficient speed to centrifugally separate the oil from the air.

An integral oil bypass system from the oil pump to the gearbox oil reservoir is provided for cold starts by the thermal bypass valve, filter pressure regulating bypass valve, oil pressure relief valve and oil pressure regulating valve.

** BEFORE GARRETT SB GTCP331-49-5451

If the APU start relay is engaged and the oil temperature at the Oil Temp. Sensor is at 20 °F (-6.7 °C) or below, the normally closed de-oil solenid is activated to open position. This is caused by a de-oil electrical circuit, provided with electrical power from the ECB. As the APU accelerates through 60 % RPM, the de-oil solenoid is de-energized by a speed switch function of the ECB.



Oil System - Schematic
Figure 004

** AFTER GARRETT SB GTCP331-49-5451

If the APU start relay is engaged and the oil temperature at the Oil Temp. Sensor is at 20 °F (-6.7 °C) or below, the normally closed de-oil solenoid is activated to open position. This is activated by a de-oil electrical circuit, provided with electrical power from the ECB. As the APU accelerates through 60 % RPM, the de-oil solenoid is de-energized by a speed switch function of the ECB. A second de-oil electrical circuit is designed to activate the normally closed de-oil solenoid to open position parallel to the first, if the oil temperature in the gearbox sump is at 25 °F (-3.9 °C) or below. An oil temperature switch, located in the gearbox sump provides electrical power to the de-oil solenoid from the starter motor during APU-Start.

** ON A/C ALL

The de-oil solenoid is also energized whenever the APU is in a shutdown condition, between 95 % and 7 % speed.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : DO NOT REMOVE GRAVITY FILLER CAP OR PRESSURE FILL AND OVERFILL PORT BLANKING CAPS WHEN OIL IS HOT OR ABOVE ADD MARK ON SIGHT GLASS.
CAUTION : DO NOT OVERFILL RESERVOIR. WHEN LEVER TYPE FILLER CAP IS FITTED MAKE CERTAIN THAT OIL LEVEL DOES NOT GO ABOVE FULL MARK ON SIGHT GLASS.
CAUTION : MAKE CERTAIN THAT OIL OVERFILL HOSE IS FITTED TO OVERFILL PORT BEFORE PRESSURE FILLING RESERVOIR. DO NOT REMOVE OVERFILL HOSE UNTIL EXCESS OIL HAS DRAINED.
CAUTION : WHEN CHANGING OIL, APU MUST BE AT OPERATING TEMPERATURE. TAKE EXTREME CARE WHEN WORKING ON OR NEAR HOT ENGINE.
CAUTION : WHEN CHANGING OIL, DO NOT USE NON-APPROVED OR MIXTURES OF BRANDS OR TYPES. FLUSH SYSTEM WITH NEW APPROVED OIL.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Container, 10 l (2.6 US gal.) Capacity
D. 98A49907616000	Unit - Oil Draining, APU
E. 98A12001017000	Tank - Engine Oil Filling Up (Portable Type)
or	
DH13PM	Tank - Engine Oil Filling Up (Portable Type)
F. Material No. 03-002	Oils (Ref. 20-31-00)
or	
Material No. 03-003	Oils (Ref. 20-31-00)
Referenced Procedures	
R - 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant
- 49-91-12, P. Block 201	Oil Filter
- 49-91-13, P. Block 201	Magnetic Drain Plug

2. Procedure

A. Deactivation
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

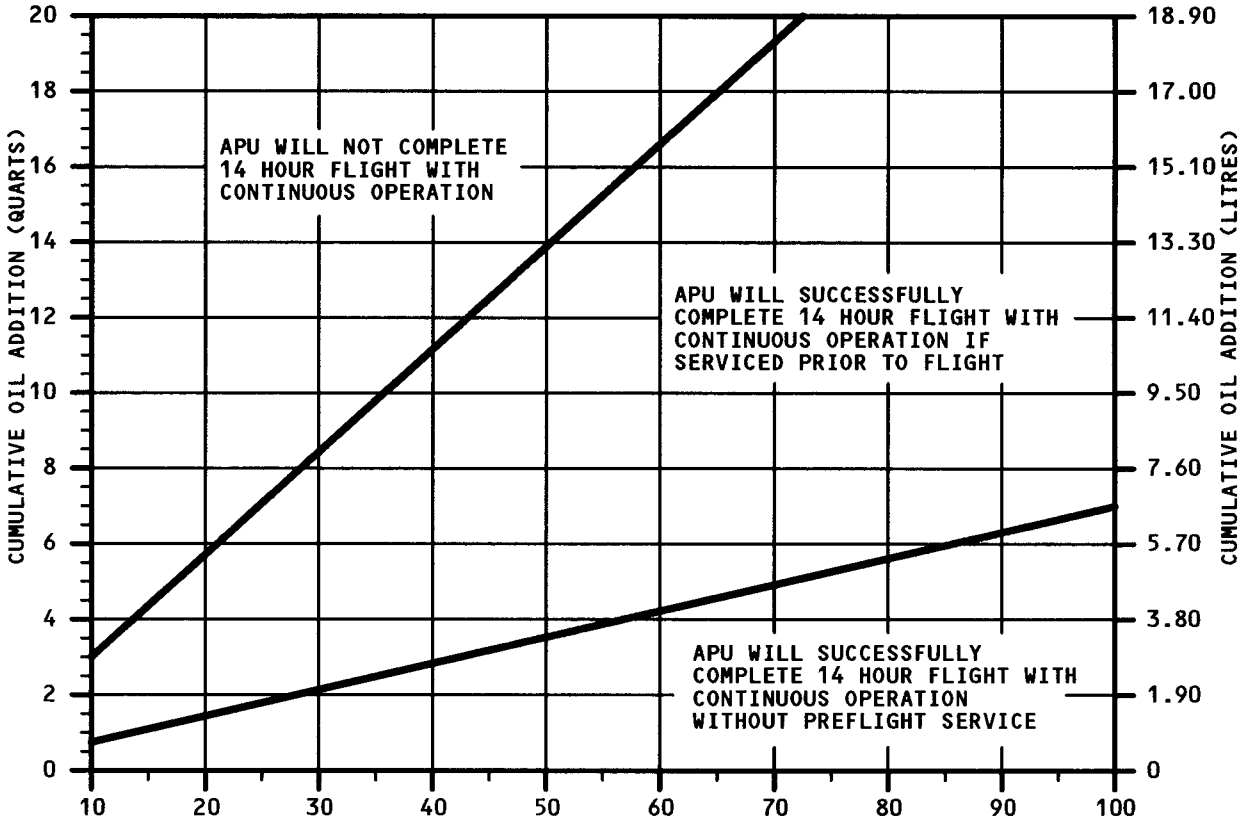
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform, open access doors 315AL, 316AR.
(c)Position container below filler ports.

B. Oil Servicing (Bayonet type cap)
(Ref. Fig. 301, 302,)
(1)Gravity Servicing
(a)Check oil level in sight glass. Add oil if the level is on or below the ADD mark on sight glass.
(b)Clean filler cap and gravity fill port area.
WARNING : DO NOT REMOVE FILLER CAP WHEN OIL IS HOT OR ABOVE ADD MARK ON SIGHT GLASS.
(c)Depress filler cap to relieve pressure.
(d)Depress and rotate filler cap 90° counterclockwise, pull cap out of filling port and wipe clean.
(e)Inspect O-rings and replace if necessary.
(f)Inspect pins and cap for damage and if damaged replace filler plug assembly.
(g)Slowly add oil (Mat. No. 03-002 or 03-003) until level reaches top of gravity fill port or FULL mark on the sight glass.
For list of approved oils Material No. 03-002 or 03-003
(Ref. 12-13-49, P. Block 1).
(h)Install filler cap into filler port by depressing the cap and rotating 90° clockwise until lockpins engage in the locking grooves.

B. Oil Servicing (Lever type cap)
(Ref. Fig. 303, 304)
(1)Gravity Servicing
(a)Check oil level in sight glass. Add oil if the level is on or below the ADD mark on sight glass.
(b)Clean filler cap and gravity fill port area.
WARNING : DO NOT REMOVE FILLER CAP WHEN OIL IS HOT OR ABOVE ADD MARK ON SIGHT GLASS.
(c)Lift lever to unlock the filler cap.
(d)Rotate lever counterclockwise until it contacts the stop.
(e)Rotate filler cap counterclockwise to disengage the locking lugs.
(f)Pull filler cap out of the filling port.
CAUTION : DO NOT OVERFILL RESERVOIR. WHEN LEVER TYPE FILLER CAP IS FITTED MAKE CERTAIN THAT OIL LEVEL DOES NOT GO ABOVE FULL MARK ON SIGHT GLASS.

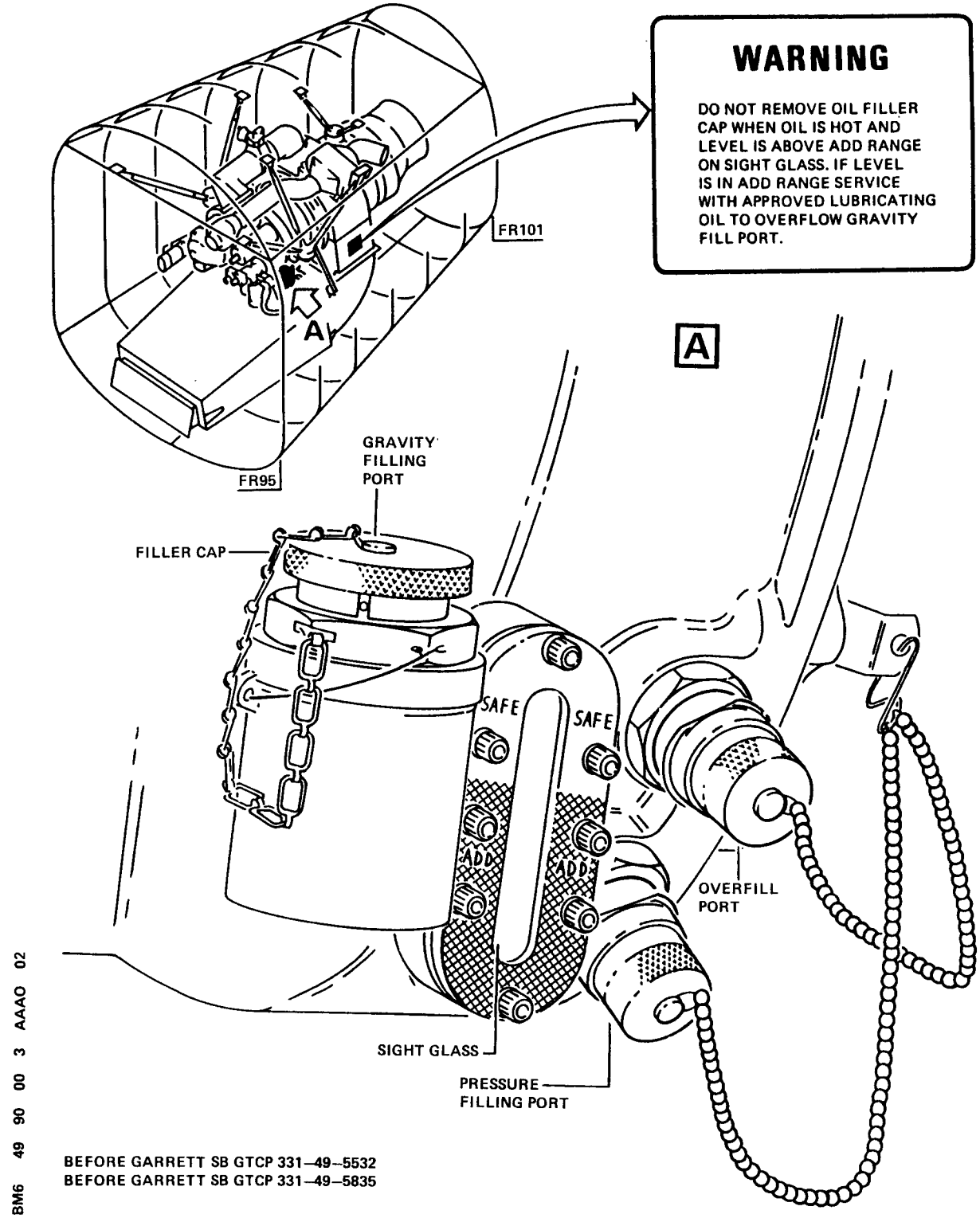
GTCP331 INSTALLED APU
IN-SERVICE OIL CONSUMPTION GUIDELINES



OPERATING TIME PERIOD DURING WHICH OIL
WAS ADDED TO APU AS NOTED ON VERTICAL SCALE

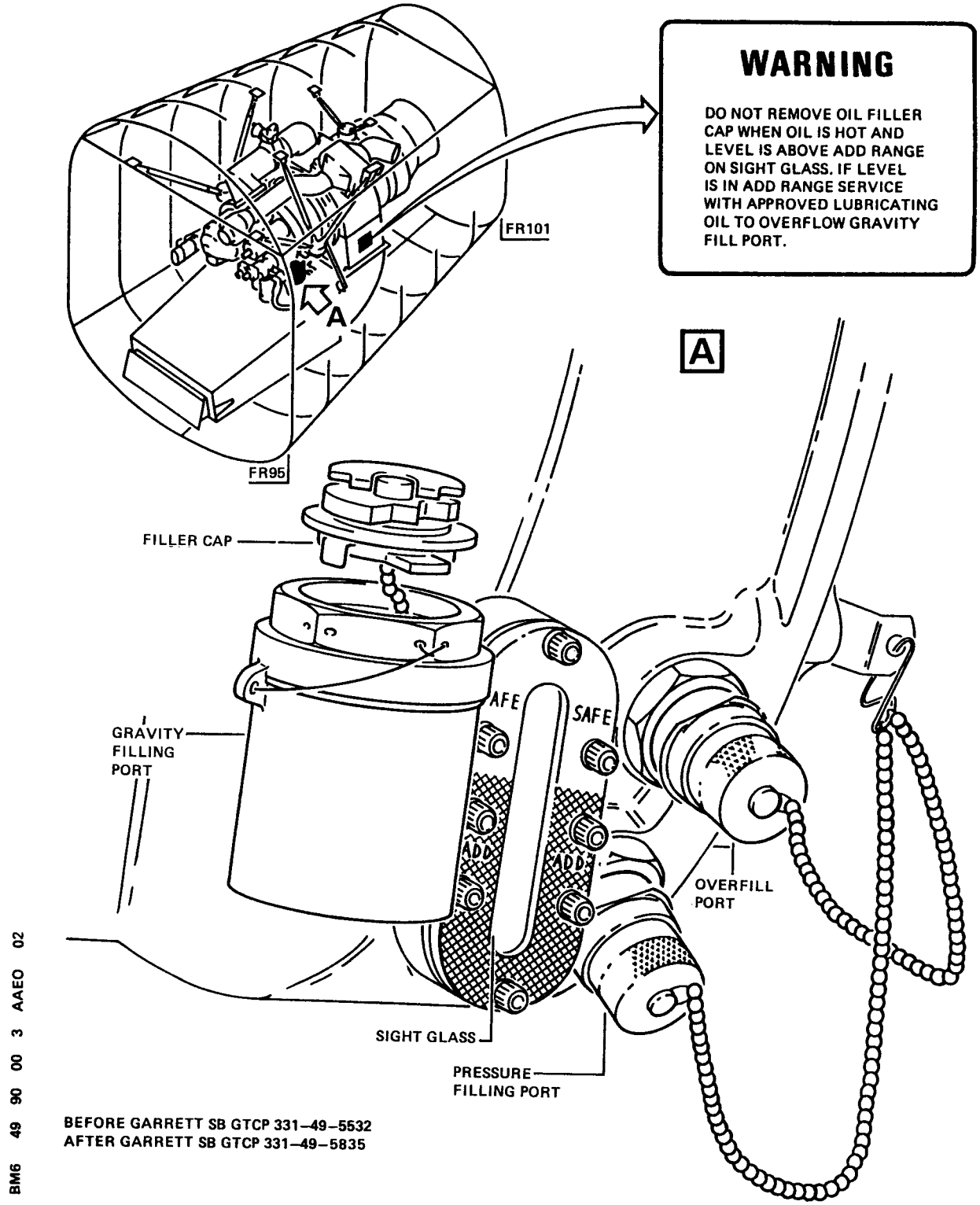
BM6 49 90 00 3 AAJO 01

In Service Oil Consumption Guidelines
Figure 301

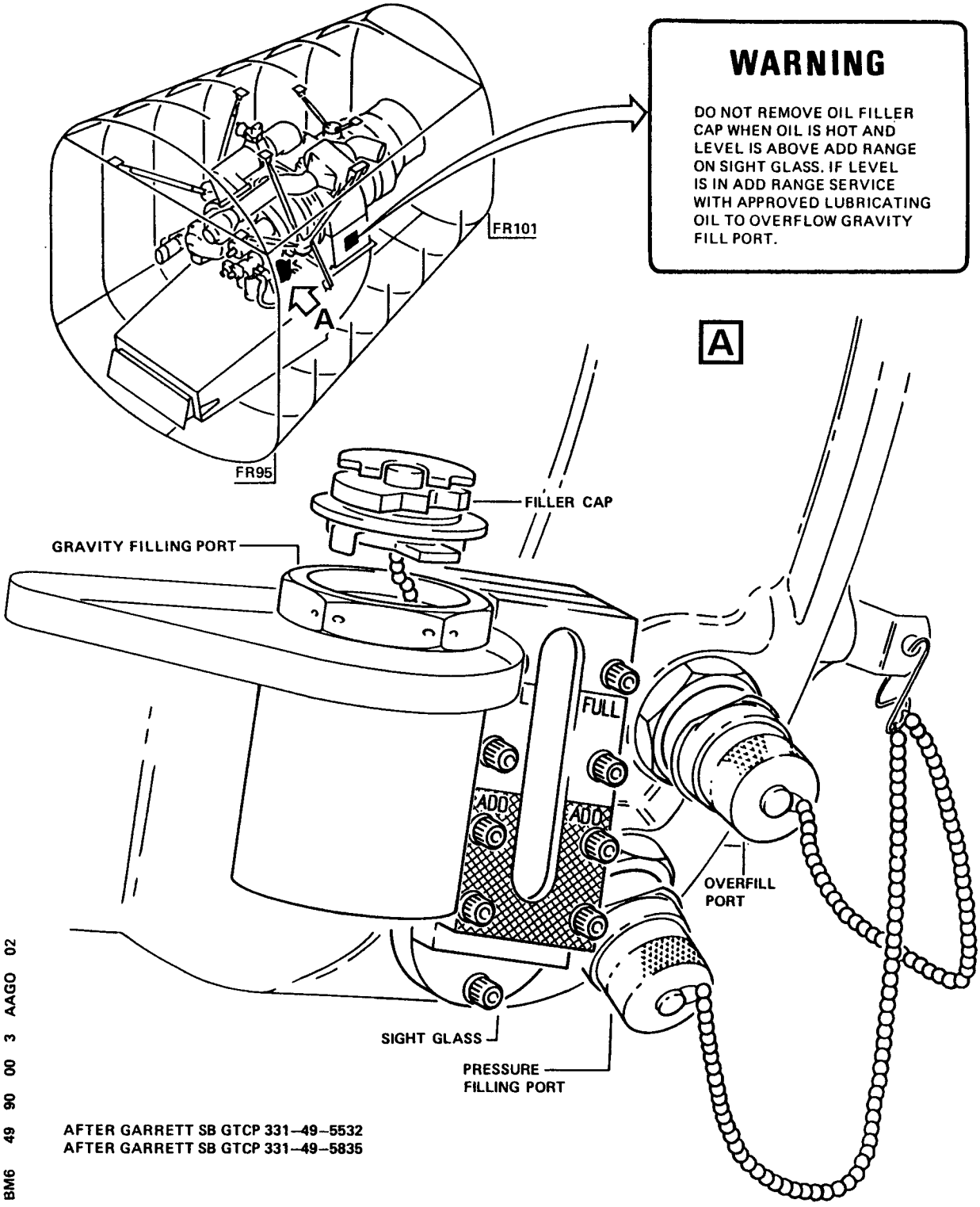

WARNING
DO NOT REMOVE OIL FILLER CAP WHEN OIL IS HOT AND LEVEL IS ABOVE ADD RANGE ON SIGHT GLASS. IF LEVEL IS IN ADD RANGE SERVICE WITH APPROVED LUBRICATING OIL TO OVERFLOW GRAVITY FILL PORT.
FR101
FR95
A
A
GRAVITY FILLING PORT
FILLER CAP
SAFE
SAFE
ADD
ADD
OVERFILL PORT
SIGHT GLASS
PRESSURE FILLING PORT
BM6 49 90 00 3 AAAO 02
BEFORE GARRETT SB GTCP 331-49-5532
BEFORE GARRETT SB GTCP 331-49-5835

Filling Ports - Location
Filling Ports - Location!
Figure 302

Fig& AACO


WARNING
DO NOT REMOVE OIL FILLER CAP WHEN OIL IS HOT AND LEVEL IS ABOVE ADD RANGE ON SIGHT GLASS. IF LEVEL IS IN ADD RANGE SERVICE WITH APPROVED LUBRICATING OIL TO OVERFLOW GRAVITY FILL PORT.
FR101
FR95
A
A
FILLER CAP
GRAVITY FILLING PORT
SAFE
SAFE
ADD
ADD
OVERFILL PORT
SIGHT GLASS
PRESSURE FILLING PORT
BEFORE GARRETT SB GTCP 331-49-5532
AFTER GARRETT SB GTCP 331-49-5835
BM6 49 90 00 3 AAEO 02

Filling Ports - Location
Figure 303


WARNING
DO NOT REMOVE OIL FILLER CAP WHEN OIL IS HOT AND LEVEL IS ABOVE ADD RANGE ON SIGHT GLASS. IF LEVEL IS IN ADD RANGE SERVICE WITH APPROVED LUBRICATING OIL TO OVERFLOW GRAVITY FILL PORT.
FR101
FR95
A
A
FILLER CAP
GRAVITY FILLING PORT
FULL
ADD
ADD
OVERFILL PORT
SIGHT GLASS
PRESSURE FILLING PORT
AFTER GARRETT SB GTCP 331-49-5532
AFTER GARRETT SB GTCP 331-49-5835
BM6 49 90 00 3 AAGO 02

Filling Ports - Location
Figure 304

(g)Slowly add oil (Mat. No.03-002 or 03-003) until level reaches FULL mark on the sight glass.
For list of approved oils Material No. 03-002 or 03-003 (Ref. 12-13-49, P. Block 1).
(h)Put filler cap into filler port and rotate clockwise to engage locking lugs.
(j)Rotate lever clockwise until it contacts the stop.
(k)Push down lever to lock the filler cap.
(2)Pressure Servicing using Tank - Engine Oil Filling Up P/N 98A12001017000 or DH13PM.
(a)Clean blanking caps of pressure filling and overfill ports.
WARNING : DO NOT REMOVE BLANKING CAPS FROM PRESSURE FILLING AND OVERFILL PORTS WHEN OIL IS HOT AND LEVEL IS ABOVE ADD RANGE ON SIGHT GLASS.
(b)Remove blanking caps from pressure filling and overfill ports.
(c)Connect overfill hose to overfill port. Direct hose into container.
(d)Connect filling hose of Tank - Engine Oil Filling Up to pressure filling port.
(e)Pressure Servicing.
CAUTION : MAKE CERTAIN THAT OIL OVERFILL HOSE IS FITTED TO OVERFILL PORT BEFORE PRESSURE FILLING RESERVOIR.
1 Slowly pump oil (Mat. No. 03-002 or 03-003) until excess oil begins to flow out of overfill hose.
For list of approved oils Material No. 03-002 or 03-003 (Ref. 12-13-49, P. Block 1).
CAUTION : DO NOT REMOVE OVERFILL HOSE UNTIL OIL LEVEL IN RESERVOIR HAS STABILIZED AND EXCESS OIL HAS DRAINED.
2 Make certain that excess oil drains completely. Wait approx. 2 minutes to allow oil to stabilize in reservoir.
(f)Disconnect overfill hose, pressure filling hose and wipe ports clean.
CAUTION : MAKE CERTAIN, THAT BLANKING CAPS ARE SECURED ON THE PORTS.
(g)Install blanking caps to their respective ports.

C. Change Oil

WARNING : WHEN CHANGING OIL, APU MUST BE AT OPERATING TEMPERATURE. TAKE EXTREME CARE WHEN WORKING ON OR NEAR HOT ENGINE.

CAUTION : WHEN CHANGING OIL, DO NOT USE NON-APPROVED MIXTURES OF BRANDS OR TYPES. FLUSH SYSTEM WITH NEW TYPE.

R NOTE : If the oil available for oil servicing is a different type
R or brand than the oil in the APU oil reservoir, flush the system
R and change the oil.
R Replenishing method (Ref. 12-13-49, P. Block 1) can only be applied
R if the oil available for oil servicing is the same type or brand as
R the oil in the APU oil reservoir.
R Add the new approved oil to the reservoir as necessary, at each oil
R servicing interval to complete the oil change.

NOTE : Drain oil while APU is still hot. If necessary start and operate APU (Ref. 49-10-00, P. Block 501).

(1)Drain
(a)Position APU oil draining unit P/N 98A49907616000 below APU drain port and direct hose into container.
(b)Remove filler cap to vent gearbox sump during draining.
(c)Check filler cap, lockpins or locking lugs and O-rings for damage. Replace if necessary.
(d)Remove magnetic drain plug (Ref. 49-91-13, P. Block 201) and drain oil.
(e)Install filler cap after draining.

(2)Inspection/Check
(a)Inspect filter of APU oil draining unit for metal particles and other foreign materials which may indicate internal engine damage. If any particles or materials are present, inspect oil pump and generator oil filter (Ref. 49-91-12, P. Block 201). Identify accumulated particles and proceed as follows:

1 Several small chips.
- Acceptable: thin slivers.
- Unacceptable: silver flakes or large pieces with machined surfaces and definite shape.

2 Medium accumulation of particles (other than silver).
- Start APU (Ref. 49-10-00, P. Block 501) and operate for a minimum of 15 minutes. Shut down APU (Ref. 49-10-00, P. Block 501) and open, safety and tag circuit breakers 50KA and 1KD. Remove and check magnetic plug:
- Acceptable: no further accumulation of chips after 15 minutes of engine operation.
- Unacceptable: continued build-up of chips on magnetic plug. Any silver flake accumulation, i.e. bearing material.

3 Heavy particle accumulation:
- Unacceptable: heavy build-up indicates abnormal engine internal conditions.

NOTE : If examinations are unacceptable, a tear down inspection is required. The APU is unserviceable.

(3)Preparation for Filling

(a)Replace filter elements of oil pump filter and generator oil filter (Ref. 49-91-12, P. Block 201).
(b)Fit new O-rings and install magnetic drain plug (Ref. 49-91-13, P. Block 201). Remove container and APU oil draining unit.

(4)Fill
(a)For gravity filling refer to Para. 2.B.(1).
(b)For pressure filling refer to Para. 2.B.(2).
(b)Start and operate APU (Ref. 49-10-00, P. Block 501) for about three to five minutes.
(c)Check oil filters, drain plug, and oil filling port for leakage.
NOTE : Leakage is not permissible.
(d)Shut down APU (Ref. 49-10-00, P. Block 501). Open, safety and tag circuit breakers 50KA and 1KD.
(e)Check oil level on sight glass. Add oil, if necessary (Ref. Para. 2.B.).

D. Close-Up
(1)Remove container and wipe area clean.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close access doors 315AL and 316AR and remove access platform.
(4)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

1. Reason for the Job

A. Scheduled Maintenance

B. Protruding Differential Pressure Indicator

2. Removal/Installation

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

NOTE : The removal/installation is similar for both the oil pump filter and the generator oil filter.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(4)	O-Rings
(5)	Container, 2 l (0.52 US gal.) Capacity
(6)Material No. 03-002	Oils (Ref. 20-31-00)
or Material No. 03-003	Oils (Ref. 20-31-00)
(7)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedures	
- 49-10-00, P. Block 501	Power Plant
- 49-90-00, P. Block 301	Oil

B. Procedure

(1)Job Set-Up

(2)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

(2)Removal

(Ref. Fig. 201)

(a)Position container below oil filter.

(b)Cut and remove lockwire and unscrew filter housing (3).

(c)Remove filter element (4) from filter housing (3) and discard O-rings (1, 2) and filter element.

(3)Installation

(a)Apply lubricant (Mat. No. 03-002 or 03-003) thinly to new O-rings (1, 2) and fit O-rings on filter element (4) and filter housing (3).

(b)Dip replacement filter element (4) in approved engine oil and insert into filter housing (3).

(c)Install filter housing (3).

1 Tighten by hand.

2 Secure with lockwire.

(d)Reset differential pressure indicator (5), if necessary.

(4)Test

(a)Start and operate APU (Ref. 49-10-00, P. Block 501). Inspect oil filter for leakage. Then shut down APU.

NOTE : Leakage is not permissible.

(b)Open, safety and tag circuit breakers 50KA, 1KD, 58KD and 71KD.

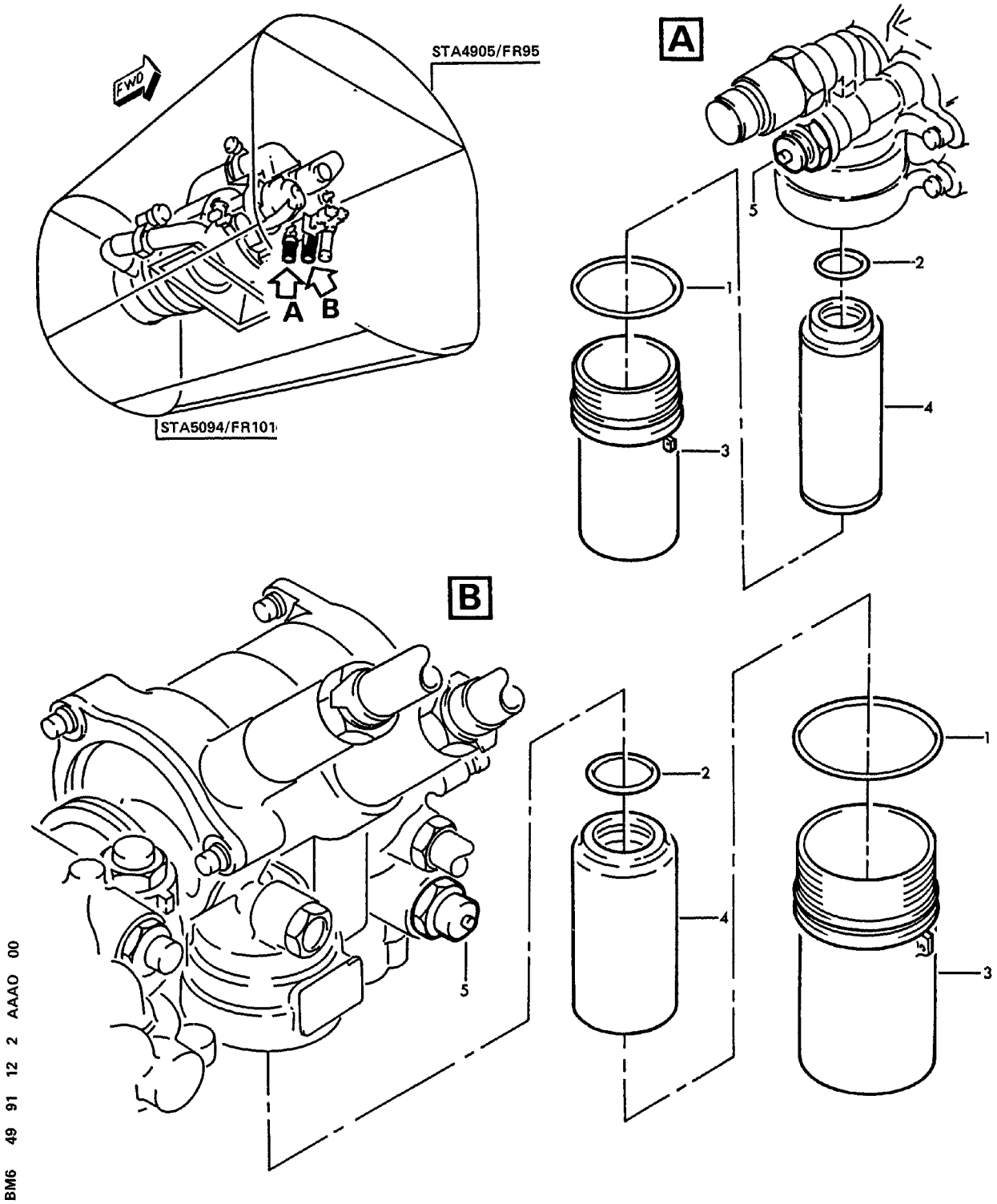
(c)Check oil level on sight glass. Replenish if necessary (Ref. 49-90-00, P. Block 301).

(5)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Close access doors 315AL and 316AR and remove access platform.

(c)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.



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Oil Filter
Figure 201

3. Inspection/Check

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

NOTE : The inspection/check procedure is similar for both the oil pump filter and the generator oil filter.

A. Referenced Procedure

- 49-10-00, P. Block 501 Power Plant
- 49-90-00, P. Block 301 Oil

B. Procedure

(1)Job Set-Up

(a)Remove oil filter element (Ref. Para. 1.).

(2)Inspection

(a)Inspect filter element for metal particles and other foreign materials which may indicate internal engine damage.
If any particles or materials are indicated, proceed as follows:
- change oil (Ref. 49-90-00, P. Block 301)
- replace both filter elements (Ref. Para. 1.)
- Start APU (Ref. 49-10-00, P. Block 501) and operate for a minimum of fifteen minutes. Then shut down APU.
- Inspect elements of oil pump filter and generator oil filter.
If no further accumulation, after 15 minutes engine run APU is acceptable for continued service.
Further accumulation after the 15 minutes run is unacceptable and APU is unserviceable.

(b)Check filter element for nicks, dents, cracked, chipped or broken mesh. Replace if necessary.

(3)Close Up

(a)Install oil filter (Ref. Para. 1.).

4. Cleaning

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

NOTE : The cleaning procedure is similar for both the oil pump filters and the generator oil filter.

A. Equipment and Materials

ITEM	DESIGNATION
(1)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

B. Procedure

(1)Job Set-Up

(a)Remove oil filter (Ref. Para. 1.).

(2)Cleaning

WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.

(a)Clean filter element and housing using cleaning agent (Mat. No. 11-002) and dry with low pressure compressed air (20 psig).

(3)Close-Up

(a)Install oil filter (Ref. Para. 1.).

1. Removal/Installation

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT No. 11-002.
THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES.
USE ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Circuit Breaker Safety Clips and Tags
(3)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.031 in.) dia.
(4)	O-Rings
(5)	Container, 12 l (3 US gal.) capacity
(6)	Torque Wrench, 0-0.60 m.daN (0-53 lbf.in.)
(7)	Torque Wrench, 1.50 m.daN (133 lbf.in.)
(8)98A49907616000	Unit - Oil Draining, APU
(9)Material No. 03-002	Oils (Ref. 20-31-00)
or	
Material No. 03-003	Oils (Ref. 20-31-00)
(10)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

B. Procedure

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

R (Ref. Fig. 201)

** Drain plug in lower position

(2)Removal

TO BE ISSUED LATER

Magnetic/Drain Plug
Figure 201

R

(a)Position APU oil draining unit below drain port and direct hose into container.
(b)Cut and remove lockwire and remove magnetic plug (4) from drain plug (2).
(c)Cut and remove lockwire and remove drain plug (2).
(d)Allow oil to drain.
(e)Discard O-rings (1, 3).

(3)Preparation for Installation
(a)Inspect magnetic plug for contamination (Ref. Para. 2.).

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT (MAT NO. 11-002).

(b)Clean magnetic plug, drain plug and if removed, bushing, use solvent (Mat. No. 11-002).
(c)Inspect drain plug check valve for damage or misalignment. replace if necessary.

**Drain plug in lower position

(4)Installation
(a)Apply oil (Mat. No. 03-002 or 03-003) to new O-rings (1, 3).
(b)Install new O-ring (3) on magnetic plug (4) and new O-ring (1) on drain plug (2).
(c)Install drain plug (2) and TORQUE to between 0.28 and 0.40 m.daN (25 and 35 lbf.in.).
(d)Install magnetic plug (4) and TORQUE to between 0.11 and 0.23 m.daN. (10 and 20 lbf.in.).
(e)Safety drain plug (2) and magnetic plug (4) with lockwire.
(f)Replenish oil system (Ref. 12-13-49, P. Block 1).

(h)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(5)Test
(a)Start and operate APU (Ref. 49-10-00, P. Block 501).
1 Carry out a leak check.
(b)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up
(a)Check oil level, replenish if necessary (Ref. 12-13-49, P Block 1).
(b)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(c)Close access doors 315AL and 316AR and remove access platform.

2. Inspection/Check

WARNING : ALLOW APU TO COOL SUFICIENTLY TO PREVENT PERSONAL INJURY:
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

Referenced Procedures
- 12-13-49, P. Block 1 APU - Replenishing
- 49-10-00, P. Block 501 Power Plant
- 49-91-12, P. Block 201 Oil Filter

Procedure

(1)Job Set-Up

CAUTION : REMOVE MAGNETIC PLUG CAREFULLY TO PREVENT LOSS OF ANY POSSIBLE CONTAMINATION.

(a)Remove magnetic plug (Ref. Para. 1.).

(2)First Inspection

(a)Inspect magnetic plug for large metallic flakes and/or chips of silver, grey or black appearance.
If any contamination is present or amount of material appears abnormal, remove and inspect oil pump and generator oil filters (Ref 49-91-12, P. Block 201).
If contamination is found in filters, drain oil (Ref.Para.1).

(b)Acceptable:
Small accumulation of material and small thin slivers.

(c)Unacceptable:
Silver flakes or large pieces with machined faces and definite shape.

(3)Second Inspection

(a)With a medium accumulation of particles other than silver.
- Clean and reinstall magnetic plug (Ref. Para. 1.).
- Replenish oil system (Ref. 12-13-49, P. Block 1).
- Start APU (Ref. 49-10-00, P. Block 501) and operate for a minimum of 15 minutes.
- Shut down APU (Ref. 49-10-00, P. Block 501).
- Remove magnetic plug (Ref. Para. 1).
- Inspect magnetic plug:

(b)Acceptable:
No further accumulation of material after 15 minutes of engine operation.

(c)Unacceptable:
Continued build-up of material on magnetic plug.
Any silver flake accumulation, i.e. bearing material.
Heavy particle accumulation build-up indicates abnormal engine conditions.

OIL PRESSURE RELIEF VALVE
REMOVAL / INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT No. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Reason for the Job

A. Oil pressure relief valve inoperative

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B	Circuit Breaker Safety Clips and Tags
C.	Blanking Caps and Plugs
D.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
E.	Container 2.0 l (0.52 US gal.)
F.	O-Rings
G. Material No. 03-002	Oils (Ref. 20-31-00)
or	
H. Material No. 03-003	Oils (Ref. 20-31-00)
J. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

3. Procedure

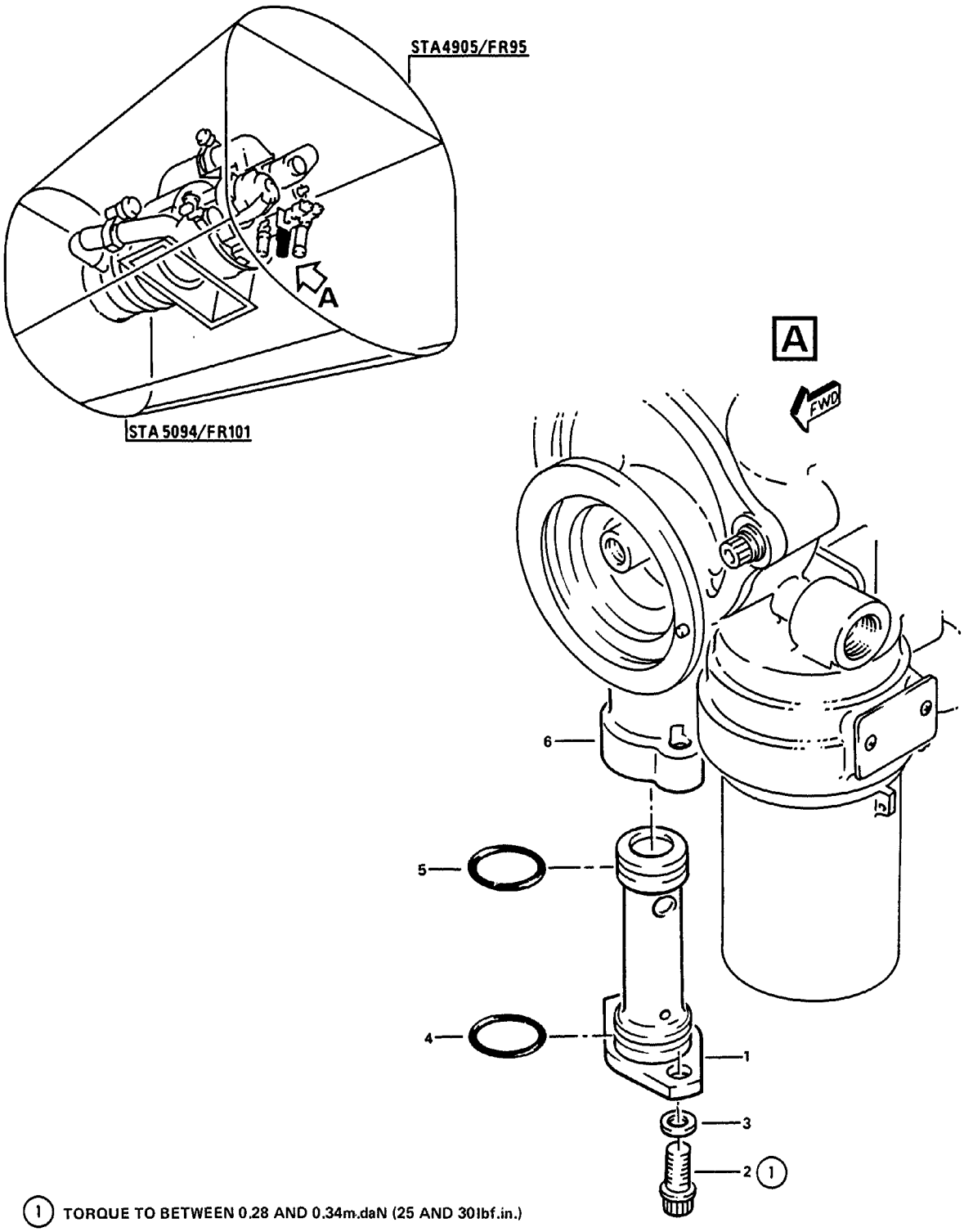
(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



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(1) TORQUE TO BETWEEN 0.28 AND 0.34m.daN (25 AND 30lbf.in.)

Oil Pressure Relief Valve
Figure 401

B. Removal
(1)Position container.
(2)Remove bolts (2), washers (3) and oil pressure relief valve (1), from lube pump housing (6).
(3)Remove O-rings (4, 5) from oil pressure relief valve (1). Discard O-rings.
(4)Fit blanking caps and plugs to all orifices.

C. Preparation for Installation
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT NO. 11-002.
(1)Clean oil pressure relief valve (1), using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Visually inspect oil pressure relief valve (1) for damage and cracks.

D. Installation
(1)Lubricate new O-rings (4, 5) with oil (Mat. No. 03-002 or 03-003).
(2)Install new O-rings (4, 5) onto oil pressure relief valve (1).
(3)Remove blanking caps and plugs.
(4)Install assembled oil pressure relief valve (1) into lube pump housing (6).
(5)Install washers (3) and bolts (2). TORQUE bolts (2) to between 0.28 and 0.34 m.daN (25 and 30 lbf.in.).
(6)Remove container.
(6)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

E. Test
(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(2)Check oil pressure relief valve for leakage.
(3)Shutdown APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-004.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. AVOID INHALATION OF FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Temperature Control Valve - Removal/Installation

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Container 2 l (0.5 US Gal)
(5)	Torque Wrench, 0 to 0.65 m.daN (0 - 55 lbf.in.)
(6)	O-Rings
(7)Material No. 03-002	Oils (Ref. 20-31-00)
or	
(8)Material No. 03-003	Oils (Ref. 20-31-00)
(9)Material No. 11-004	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

B. Procedure

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

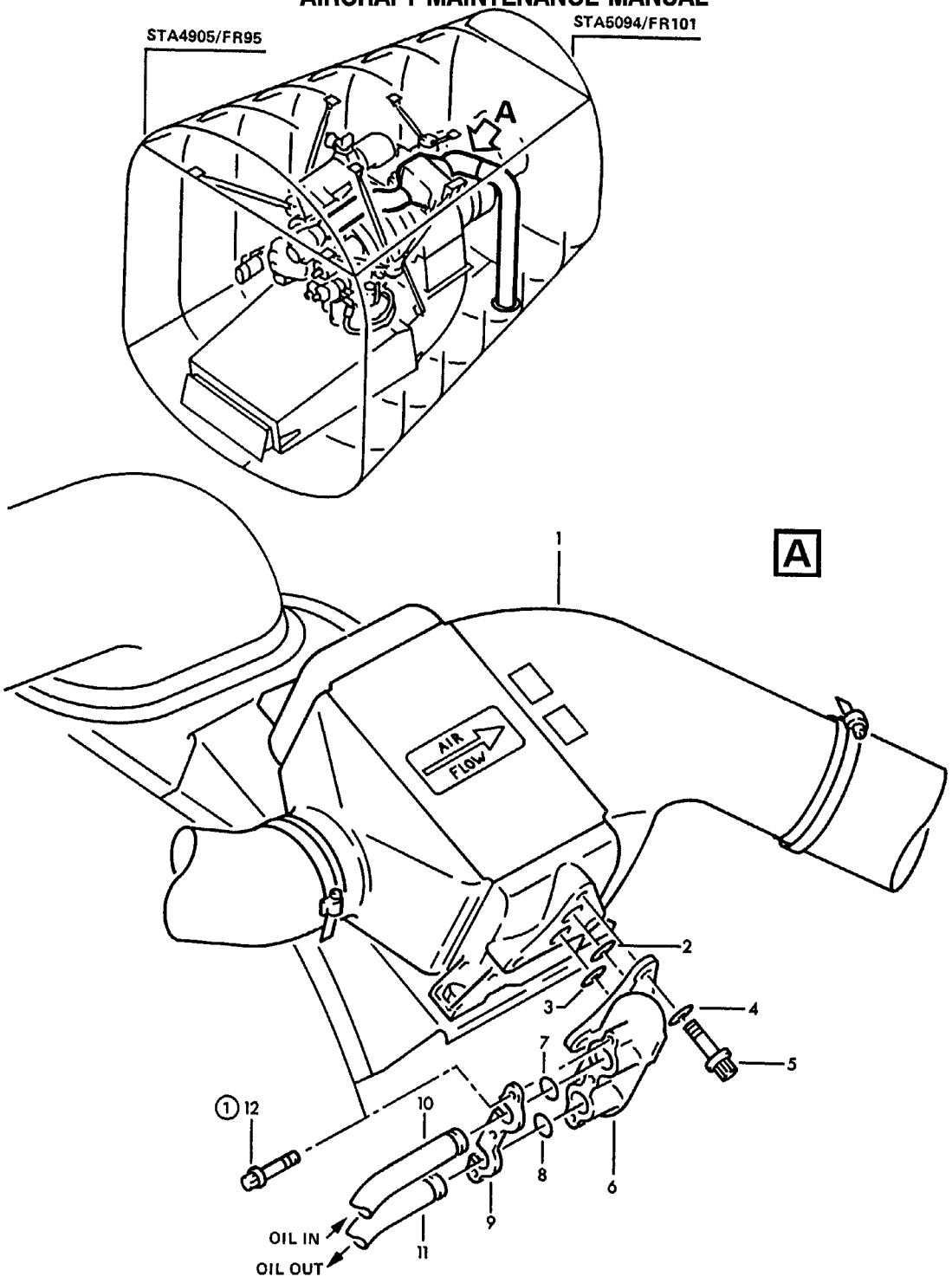
(2)Removal
(Ref. Fig. 201)
(a)Position container below control valve (6).
(b)Remove bolts (12) and retainer plate (9).
(c)Remove inlet line (10) from control valve (6).
(d)Remove outlet line (11) from control valve (6).
(e)Remove bolts (5) and washers (4).
(f)Remove control valve (6) from oil cooler (1).
(g)Remove O-rings (2, 3, 7, 8).
(h)Discard O-rings (2, 3, 7, 8).
(j)Install blanking caps and plugs to the open lines and ports.
(k)Remove container.

(3)Preparation for Installation
WARNING : CLEANING AGENT MAT. NO. 11-004 IS DANGEROUS.
(a)If necessary, clean external surfaces of control valve (6) with cleaning agent (Material No. 11-004).
(b)Check the interfaces of cooler (1) and control valve (6) for wear and damage.

(4)Installation
(a)Position container below control valve (6).
(b)Remove blanking caps and plugs from oil lines and ports.
(c)Apply engine oil (Material No. 03-002 or 03-003) to new O-rings (2, 3, 7, 8).
(d)Install new O-rings (2, 3, 7, 8).
(e)Position control valve (6) onto oil cooler (1).
(f)Install washers (4) and bolts (5).
(g)Tighten bolts (5).
(h)Install inlet line (10) to upper aperture, and outlet line (11) to lower aperture of control valve (6).
(j)Install retainer plate (9) and bolts (12).
(k)TORQUE bolts (12) to between 0.56 and 0.62 m.daN (50 and 55 lbf.in.).
(l)Remove container.
(m)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

(5)Test
(a)Check APU oil level. (Ref. 12-13-49, P. Block 1).
(b)Start and operate APU (Ref. to 49-10-00, P. Block 501).
(c)Check control valve connections for oil leaks.
(d)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up
(a)Make certain that the working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.



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(1) TORQUE TO BETWEEN 0.56 AND 0.62 m.daN (50 AND 55 lbf. in.)

Temperature Control Valve
Figure 201

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

	ITEM	DESIGNATION
	A.	Access Platform, 6 m (20 ft.)
R	A.	Protective Covers
R	B.	Circuit Breaker Safety Clips and Tags
R	C.	Torque Wrench, 0 - 1.0 m.daN (0 - 88.5 lbf.in.)
R	D. Material No. 05-043	Special Materials (Ref. 20-31-00)
	Referenced Procedure	
	- 49-10-00, P. Block 501	Power Plant
R	- 49-91-15, P. Block 201	Oil Cooler

2. Procedure

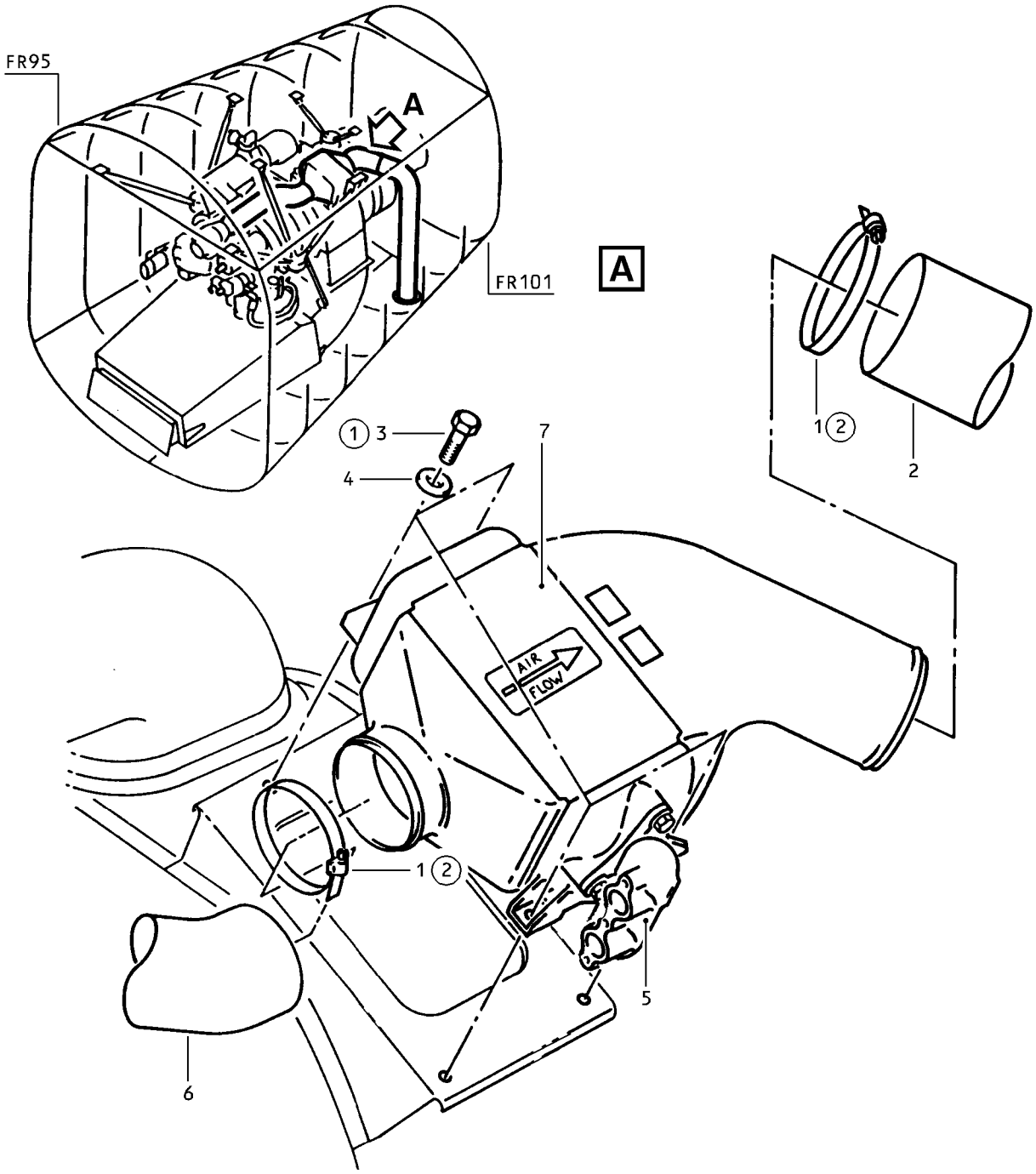
A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

B. Removal
(Ref. Fig. 401, 402)
(1)Release clamps (1) and disconnect cooling air inlet duct (6) and outlet duct (2). Fit protective covers.
(2)Remove the temperature control valve (5) (Ref. 49-91-15, P. Block 201).
(3)Remove bolts (3), washers (4) and remove oil cooler (7) from mount bracket.

C. Preparation for Installation
(1)Visually inspect oil cooler and attachment bracket for cracks, corrosion or other damage.



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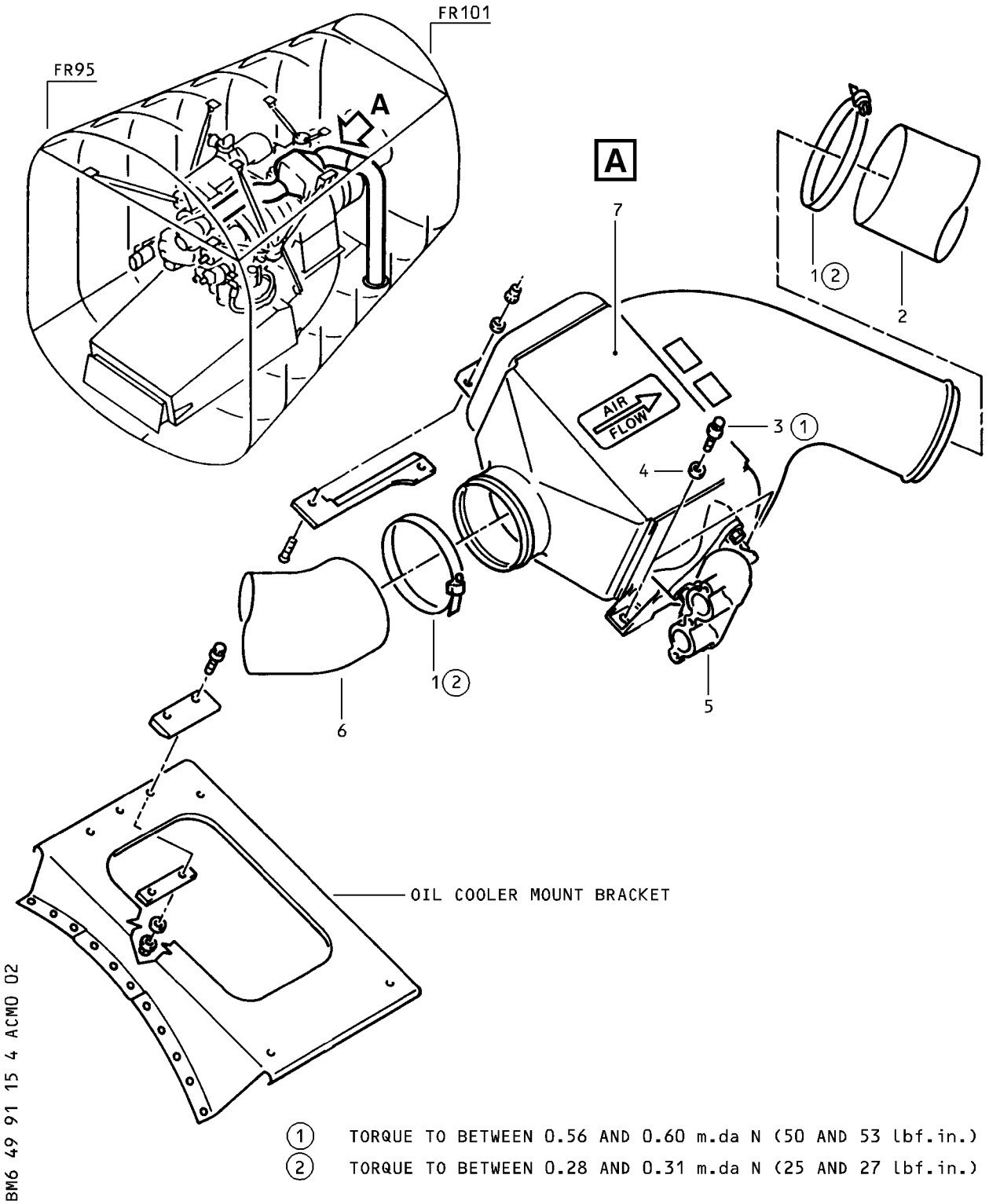
(1) TORQUE TO BETWEEN 0.56 AND 0.60 m.da N (50 AND 53 lbf.in.)
(2) TORQUE TO BETWEEN 0.28 AND 0.31 m.da N (25 AND 27 lbf.in.)

Oil Cooler
Figure 401



1 TORQUE TO BETWEEN 0.56 AND 0.60 m.da N (50 AND 53 lbf.in.)
2 TORQUE TO BETWEEN 0.28 AND 0.31 m.da N (25 AND 27 lbf.in.)

Oil Cooler with Quick Release
Figure 402

D. Installation
(1)Position oil cooler (7) and install washers (4) and bolts (3).
(2)TORQUE bolts (3) to between 0.56 and 0.6 m.daN (50 and 53 lbf.in.).
CAUTION : MAKE CERTAIN THAT THE OIL PRESSURE AND RETURN LINES ARE CONNECTED TO THEIR CORRECT PORTS AT THE TEMPERATURE CONTROL VALVE.
(3)Install the temperature control valve (5) (Ref. 49-91-15, P. Block 201).
(4)Connect cooling air inlet duct and outlet duct.
(a)Remove protective covers.
(b)Apply a thin layer of Teflon spray (Mat. No. 05-043) to inner and outer surfaces of ducts (2), (6).
(c)Connect cooling air inlet duct (6), outlet duct (2) and secure with clamps (1).
CAUTION : TO AVOID DAMAGE TO MOUNTING SURFACES, DO NOT OVERTORQUE CLAMPS.
(d)TORQUE clamps (1) to between 0.28 and 0.31 m.daN (25 and 27 lbf.in.).

(5)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

E. Test

(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(2)Check cooling air inlet and outlet duct connections for air leakage.
(3)Check oil pressure and return line connections at temperature control valve for oil leakage.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

OIL COOLER - CLEANING/PAINTING

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.
R WARNING : CLEANING AGENT (MAT. NO. 11-013) AND TC 100 ARE DANGEROUS.
R USE IN A WELL VENTILATED AREA. AVOID BREATHING FUMES OR CONTACT
R WITH SKIN.
R WARNING : MAKE CERTAIN THAT YOU WEAR THE CORRECT PROTECTIVE CLOTHING
R WHEN YOU CARRY OUT THESE PROCEDURES:

1. Reason for the Job

A. Oil cooler clogging.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Dry Compressed Air
R D.	Protective Gloves and Goggles
R E.	Heat Resistant Gloves
R F. Material No. 11-013	Cleaning Agents (Ref. 20-31-00)
R G. Material TC 100	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-91-15, P. Block 401	Oil Cooler

3. Procedure

A. Job Set-Up
(1)Remove oil cooler (Ref. 49-91-15, P. Block 401).

R B. Cleaning by Immersion
R WARNING : CLEANING AGENTS (MAT. NO. 11-013) AND TC 100 ARE DANGEROUS
R USE IN A WELL VENTILATED AREA.
R NOTE : The following procedures are for cleaning oil cooler matrix only.
R NOTE : The cleaning agent is used at 100%, alternate cleaning
R agents must be used in accordance with manufacturers instructions.
R (1)Fit blanking plugs to the oil inlet and outlet ports.
R (2)Prepare the cleaning agent.
R (a)Fill the cleaning tank with enough cleaning agent (Mat. No 11-013)
R or TC 100 to completely immerse the cooler.
R (b)Heat the cleaning agent to the recommended temperature if the
R cooler is heavily contaminated.
R CAUTION : DO NOT KEEP THE COOLER IN THE CLEANING AGENT FOR MORE
R THAN FOUR HOURS AS THIS CAN DAMAGE THE COOLER.
R (3)Immerse cooler in the cleaning agent for a maximum time of four hours.
R (4)Agitate the cooler to remove any trapped air.

R (5)Flush the agent through the cooler matrix to speed up the cleaning.
R (6)Remove the cooler from the cleaning tank and drain.
R (7)Rinse the cooler throughly with clean water.
R (8)Carry out the visual inspection detailed in para D.

R C. Cleaning by Steam
R CAUTION : MAKE CERTAIN THAT THE TIP OF THE STEAM CLEANING WAND DOES NOT
R COME NEARER THAN 30 CENTIMETERS (12 INCHES) TO THE MATRIX
R OF THE COOLER.
R (1)Fit blanking plugs to the oil inlet and outlet ports.
R (2)Prepare the steam cleaning solution.
R (a)Add a small amount of cleaning agent (Mat. No. 11-013) or TC-100 to
R the water to assist with removing heavy contamination from the cooler.
R (b)Set the pressure of the steam cleaner to between 1.7 and 2.0 bar
R (25 and 30 psi).
R WARNING : WEAR THE PROTECTIVE GLOVES AND GOGGLES WHEN USING CLEANER:
R (3)Direct the cleaner spray through the cooler matrix until the cooler
R is clean, rotate the cooler to clean from both sides.
R (4)Repeat the cleaning process as many times as needed to clean the
R cooler thoroughly.
R (5)Rinse the cooler with clean water until all trace of the cleaning agent
R is removed.
R (6)Carry out the visual inspection detailed in para D.

R D. Visual Inspection of the Cooler
R WARNING : WEAR THE PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
R (1)Blow excess water out of the cooler matrix with compressed air, use a
R maximum pressure of 1.7 to 2.0 bar (25 to 30 psi).
R (2)Shine a light through the matrix and check it is free of contamination.
R (3)Check the cooler is free from damage.
R (4)If the cooler is not clean, repeat the cleaning procedure. Do not exceed
R the maximum immersion time of four hours.
R (5)If the cooler cannot be cleaned properly, return it to the workshop
R for servicing.

R E. Drying the Oil Cooler.
R WARNING : WEAR THE PROTECTIVE GOGGLES WHEN USING COMPRESSED AIR.
R (1)Remove as much water as possible from the cooler with compressed air.
R (2)Remove the blanking plugs from the oil inlet and outlet ports.
R (3)Put the cooler into an oven at the temperature of 121 deg.C.
R plus/minus 14 deg. C. (250 deg. F. plus/minus 25 deg. F).
R (4)Leave the cooler in the oven for a minimum of two hours or until
R the cooler is dry.
R WARNING : WEAR THE HEAT RESISTANT GLOVES WHEN YOU DO

R THIS PROCEDURE.
R (5)Remove cooler from oven and while still hot, bolw through with
R compressed air to remove any trapped moisture.
R (6)Repeat the drying procedure until the cooler is completely dry.
R F. Close-Up
R (1)Install oil cooler (Ref. 49-91-15, P. Block 401).

R (2)Make certain that working area is clean and clear of tools and miscel-
R laneous items of equipment.

OIL PUMPS - REMOVAL/INSTALLATION

NOTE : This page block contains removal/installation procedures for both the engine oil pump and the generator scavenge pump.

1. Engine Oil Pump

R WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE
R CERTAIN THAT FIRE FIGHTING EQUIPMENT IS READILY AVAILABLE.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(4)	Container, 2 l (0.5 US gal.) Capacity
(5)	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
(6)	Circuit Breaker Safety Clips and Tags
(7)	O-Rings
(8)Material No. 03-002	Oils (Ref. 20-31-00)
or	
(9)Material No. 03-003	Oils (Ref. 20-31-00)

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-32-11, P. Block 401	Fuel Control Unit
- 49-91-12, P. Block 201	Oil Filters
- 49-91-13, P. Block 201	Magnetic Drain Plug

B. Procedure

(Ref. Fig. 401)

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

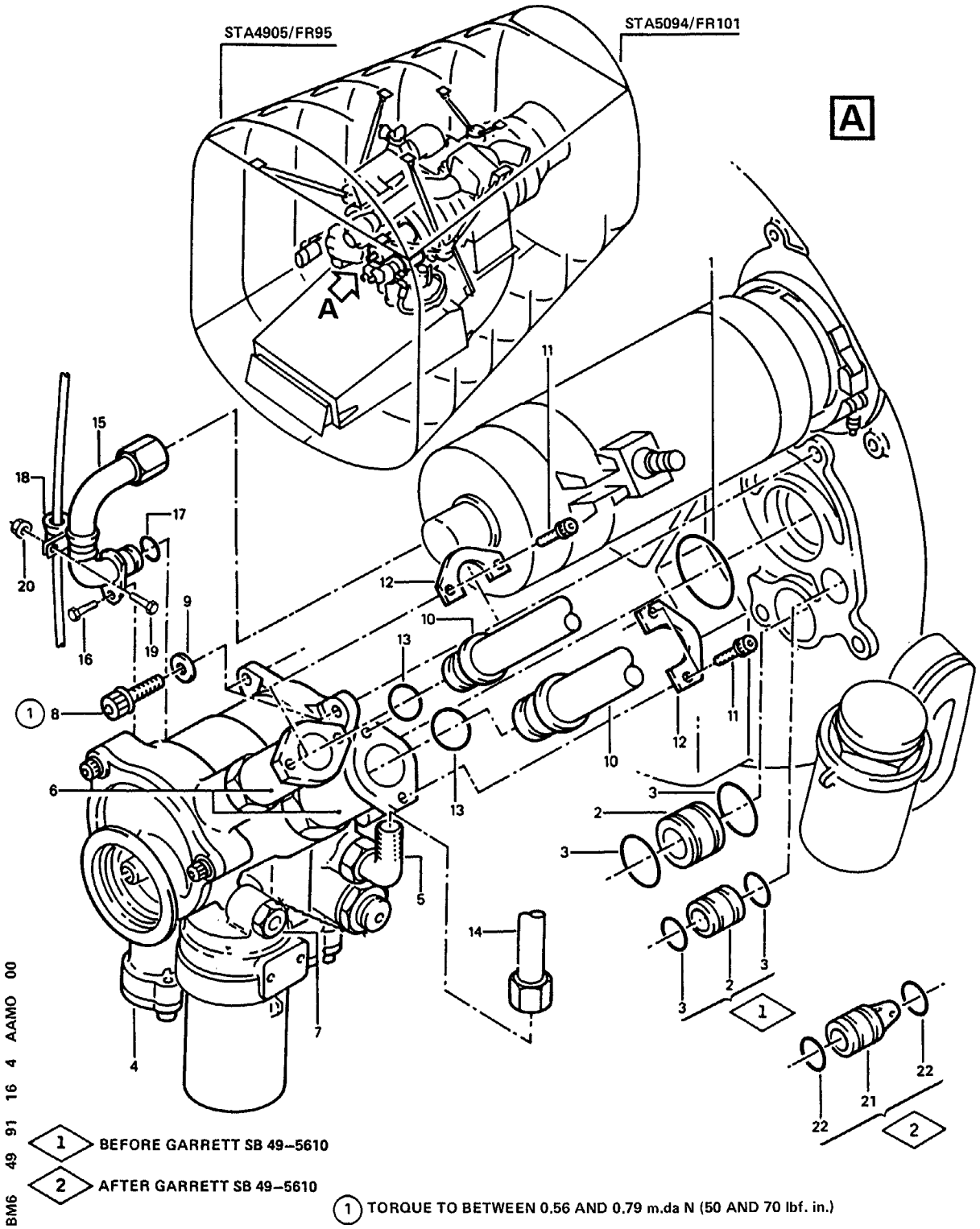
(2)Removal

NOTE : Fit blanking caps and plugs to all uncovered orifices, disconnected lines and hoses.

(a)Remove fuel control unit (Ref. 49-32-11, P. Block 401).

(b)Position container below oil pump.

(c)Remove bolts (11) and retainer plates (12). Disconnect and drain oil hoses (10). Discard O-rings (13).


STA4905/FR95
STA5094/FR101
A
A
BM6 49 91 16 4 AAMO 00
1 BEFORE GARRETT SB 49-5610
2 AFTER GARRETT SB 49-5610
1 TORQUE TO BETWEEN 0.56 AND 0.79 m.da N (50 AND 70 lbf. in.)

Engine Oil Pump
Figure 401

(d)Disconnect oil line (14) at elbow fitting (5).
(e)Remove nut (20) and screw (19) to release clamps (18).
(f)Remove bolt (16). Disconnect and remove de-oiling line (15).
(g)Remove and discard O-ring (17).
(h)Support oil pump (4) and remove bolts (8), washers (9) and oil pump.
(j)Remove transfer tubes (2) or one transfer tube (2) and one transfer tube (21) and discard O-rings (3) or (22).
(k)Discard flange O-ring (1).
(l)Remove and drain container.

(3)Preparation for Installation

WARNING : A SHEARED OIL PUMP SHAFT IS USUALLY CAUSED BY METAL PARTICLES JAMMING THE PUMP GEARS. THESE PARTICLES MAY ORIGINATE FROM ANY FAILED OR FAILING COMPONENT WITHIN THE ENGINE OIL SYSTEM. IDENTIFY AND LOCATE THE FAULTY COMPONENT. IF COMPONENT IS LINE REPLACEABLE, REPLACE, ENSURE SYSTEM IS DECONTAMINATED AND INSTALL NEW PUMP BEFORE OPERATING ENGINE.
IF FAULTY COMPONENT IS NON-LINE REPLACEABLE OR CONTAMINANT SOURCE CANNOT BE ISOLATED, REPLACE APU.

(a)Visually inspect oil pump for damage. Replace, if necessary.

1 For replacement, the following items must be transferred to the new oil pump:

CAUTION : TRANSFERRED ITEMS FROM A CONTAMINATED SOURCE MUST BE THOROUGHLY CLEANED AND CHECK VALVES (6) FUNCTIONALLY TESTED BEFORE INSTALLATION ON NEW PUMP.

- Pressure and return check valves (6).
- Elbow fitting (5).
- Blanking Plug (7). Safety with lockwire.

NOTE : Fit new O-rings to all items before installation.

2 When inspection determines a sheared oil pump drive shaft, carry out the following procedures:

CAUTION : OBSERVE STARTER MOTOR DIRECTION OF ROTATION.

- Remove starter motor front face cover and carefully rotate the engine using a wrench on flats of starter motor manual drive shaft. During rotation determine source and cause of any unusual noise, drag or jamming. If there is any evidence of internal mechanical failure of main engine bearings, gearbox bearings, gear teeth or any non-line replaceable component, the APU must be replaced. Remove wrench and reinstall starter front face cover.
- Check differential pressure indicators of generator and oil pump filters. Inspect both oil filters (Ref. 49-91-12, P. Block 201) and magnetic plug (Ref. 49-91-13, P. Block 201). If filter elements and/or magnetic plug have excessive accumulations of metal particles do not operate APU.
  Investigate further, establish cause of contamination and rectify.
- If internal mechanical failure is diagnosed or source of contamination cannot be located, replace APU.
- If no evidence of excessive particle contamination is found, inspect the fuel control unit and splined shaft for any indication of mechanical failure. If necessary replace fuel control unit, splined shaft or oil pump.

(4)Installation

NOTE : Remove blanking caps and plugs from lines, hoses and orifices before installation.

(a)Thinly coat O-rings (3) or (3, 22) using oil (Mat. No. 03-002 or 03-003) and install.

(b)Install transfer tubes (2) or one transfer tube (2) and one transfer tube (21) into gearbox sockets.

(c)Thinly coat flange O-ring (1) using oil (Mat. No. 03-002 or 03-003) and position on oil pump housing.

NOTE : Transfer tube (21) is installed after GARRETT SB-49-5610.

(d)Carefully position oil pump (4) making certain that transfer tubes (2) or one transfer tube (2) and one transfer tube (21) enter oil pump base properly and that no gap exists between oil pump flange and gear box.

(e)Install washers (9) and bolts (8). TORQUE bolts (8) to between 0.56 and 0.79 m.daN (50 and 70 lbf.in.).

(f)Connect oil line (14).

(g)Install new O-rings (13), connect oil hoses (10) and secure with retainer plates (12) and bolts (11).

(h)Install new O-rings (17), connect de-oiling line (15) and install bolt (16).

(j)Position clamps (18) and install screw (19) and nut (20).

(k)Install fuel control unit (Ref. 49-32-11, P. Block 401).

(l)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

(5)Test

(a)Start and operate APU (Ref. 49-10-00, P. Block 501).

1 Check oil pump and fuel control unit connections for leakage.

(b)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Close access doors 315AL and 316AR and remove access platform.

2. Generator Scavenge Pump

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

A. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Plugs
C.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
D.	Circuit Breaker Safety Clips and Tags
E.	O-Rings
F. Material No. 03-002	Oils (Ref. 20-31-00)
or	
G. Material No. 03-003	Oils (Ref. 20-31-00)

Referenced Procedures

- 24-23-11, P. Block 401	APU AC Generator (8XS)
- 49-10-00, P. Block 501	Power Plant

B. Procedure

(Ref. Fig. 402)

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

ITEM	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.

(c)Remove APU generator (Ref. 24-23-11, P. Block 401).

(2)Removal

(a)Remove bolts (1), washers (2) and scavenge pump (3).

1 Discard O-rings (4).

(3)Installation

(a)Inspect generator scavenge pump for damage. Replace if necessary.

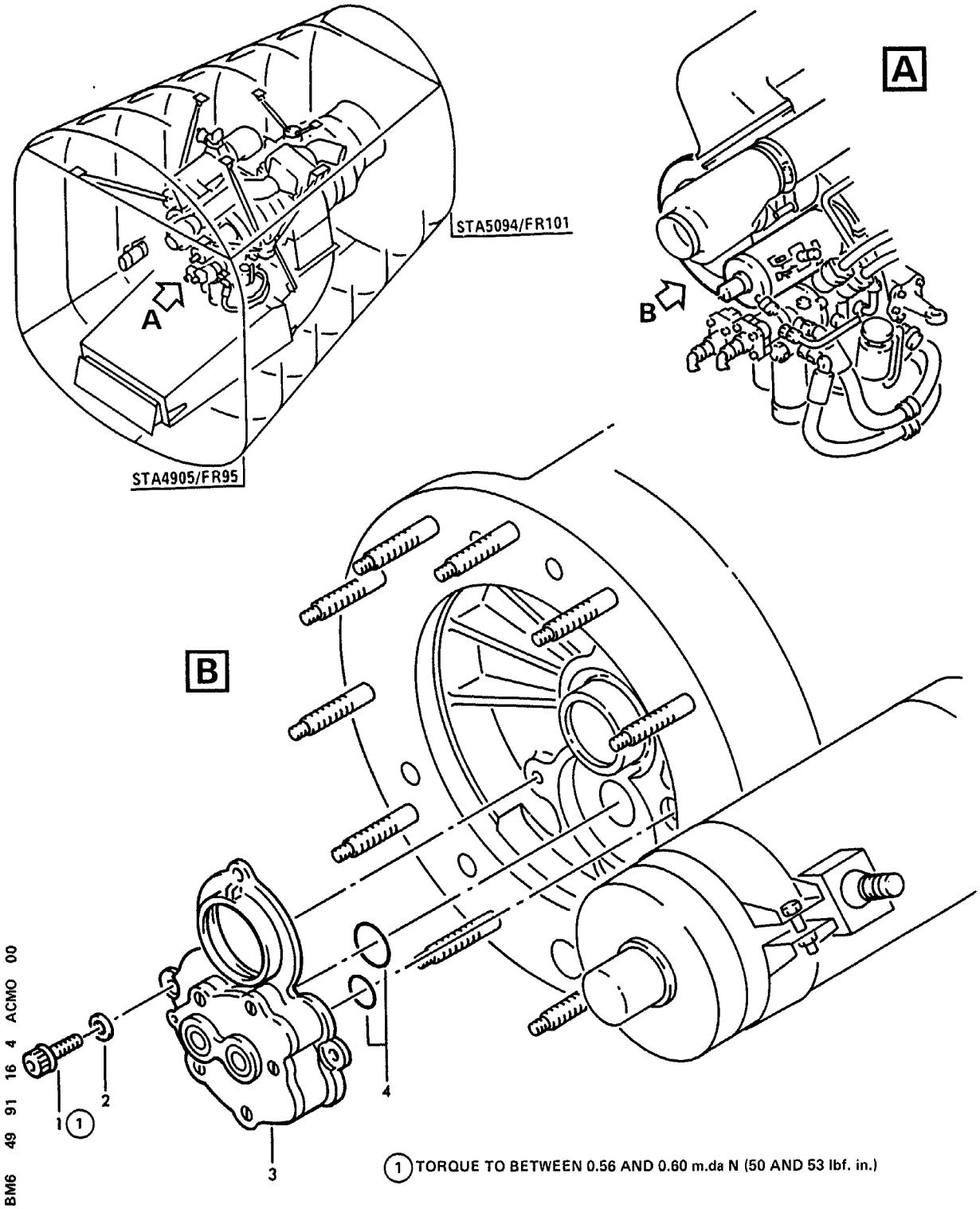
(b)Thinly coat new O-rings (4) using oil (Mat. No. 03-002 or 03-003) and position on scavenge pump.

(c)Position scavenge pump (3) and install washers (2) and bolts (1).

(d)TORQUE bolts (1) to between 0.56 and 0.60 m.daN (50 and 53 lbf.in.).

(e)Install APU AC generator (Ref. 24-23-11, P. Block 401).

(f)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.



Generator Scavenge Pump
Figure 402

(4)Test
(a)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
133VU	ELEC PWR/APU GEN/GCU/SUPPLY	6XS	U83
133VU	ELEC PWR/APU GEN/GCU/WARN	5XS	U84

(b)Start and operate APU (Ref. 49-10-00, P. Block 501).
1 Inspect generator flange for oil leakage.
(c)Set generator on line:

ACTION	RESULT
1. On ELEC PWR panel 424VU: - Press APU GEN pushbutton.	On ELEC PWR panel 424VU: - OFF/R legend goes off. - Annunciators AC BUS 1 OFF and AC BUS 2 OFF go off. - Annunciator AC EMERG ON INV goes off.
2. On ELEC IND panel 425VU: - Rotate AC selector to APU GEN position and check indications.	On ELEC IND panel 425VU: - AC LOAD, AC V and FRQ Hz indications within limits.

(d)Shut down APU (Ref. 49-10-00, P. Block 501).
(5)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access doors 315AL and 316AR and remove access platform.

NORMALLY CLOSED SOLENOID (DE-OIL) VALVE - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Circuit Breaker Safety Clips and Tags
D.	Torque Wrench, up to 0.8 m.daN (70 lbf.in.)
E.	O-Rings
F.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
G. Material No. 03-002	Oils (Ref. 20-31-00)
or	
H. Material No. 03-003	Oils (Ref. 20-31-00)

Referenced Procedures

- 49-00-00, P. Block 501	Airborne Auxiliary Power

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

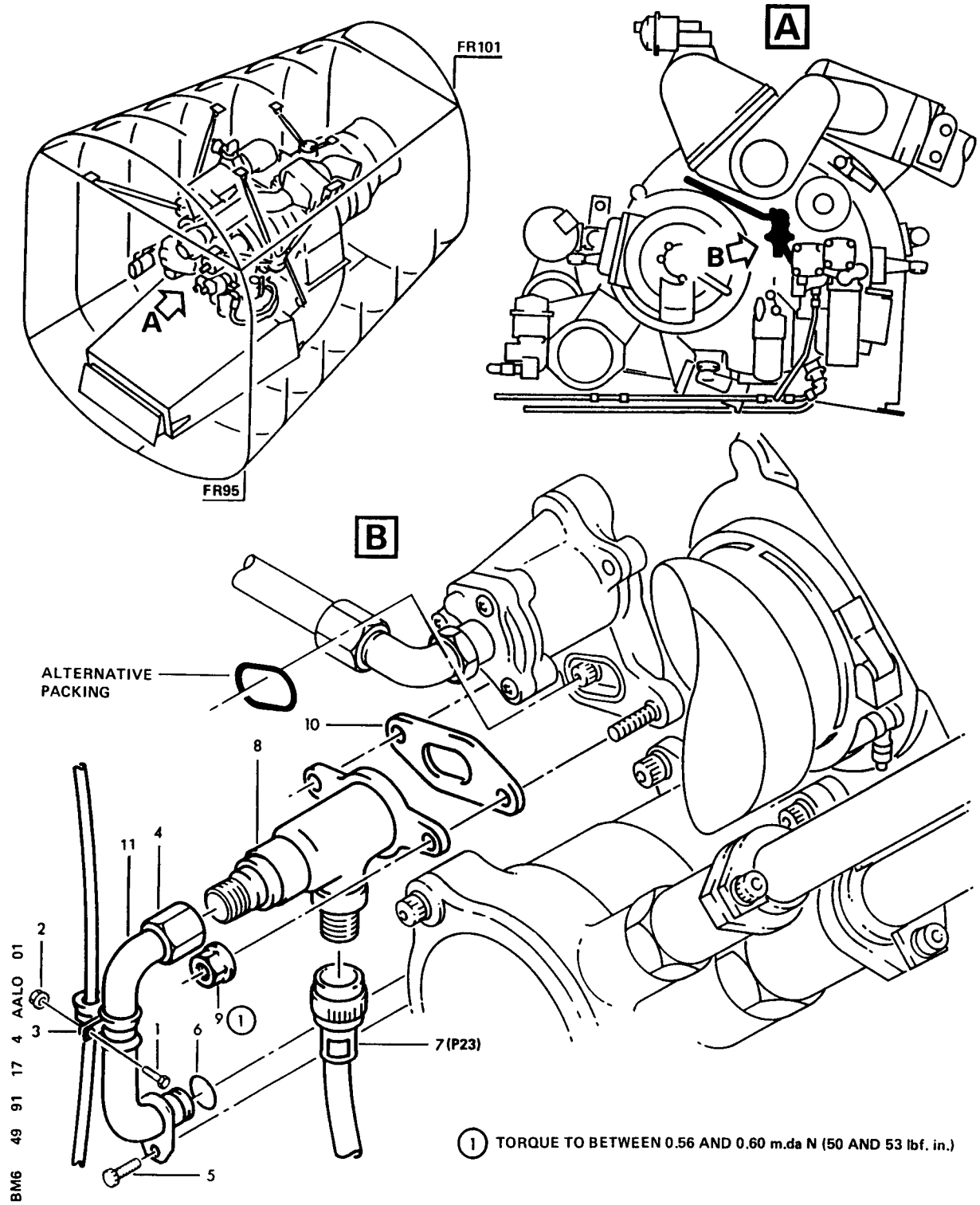
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

(Ref. Fig. 401)

B. Removal
(Ref. Fig. 401, 402)
(1)Cut and remove lockwire and disconnect electrical connector P23 (7) from de-oil valve (8).
(2)Remove nut (2), bolt (1) and release clamp (3).
(3)Remove bolt (5), disconnect nut (4) and remove de-oiling tube (11).
(4)Remove and discard O-ring (6).
(5)Remove nuts (9) and de-oil valve (8).
(6)Remove and discard gasket (10).
(7)Install blanking caps and plugs.

C. Preparation for Installation
(Ref. Fig. 402)
(1)Disassemble de-oil valve assembly.
(a)Remove reducer (13) from de-oil valve (8).
(b)Loosen locknut (15) and remove union (16) from de-oil valve (8).
(c)Remove and discard O-rings (14).
(d)Remove adapter (18) from union (16).
(e)Remove and discard O-ring (17).
(f)Inspect reducer (13), locknut (15), union (16), adapter (18) and de-oil valve (8) for damage. Replace if necessary.
(2)Assemble de-oil valve assembly.
(a)Apply a thin layer of oil (Mat. No. 03-002 or 03-003) to new O-rings (14) and (17).
(b)Put locknut (15) fully onto union (16).
(c)Fit new O-ring (14) onto reducer (13) and new O-rings (14) and (17) onto union (16).
(d)Install union (16) into adapter (18).
(e)Screw union (16) fully into de-oil valve (8), then unscrew one full turn.
(f)Install reducer (13) into de-oil valve (8).



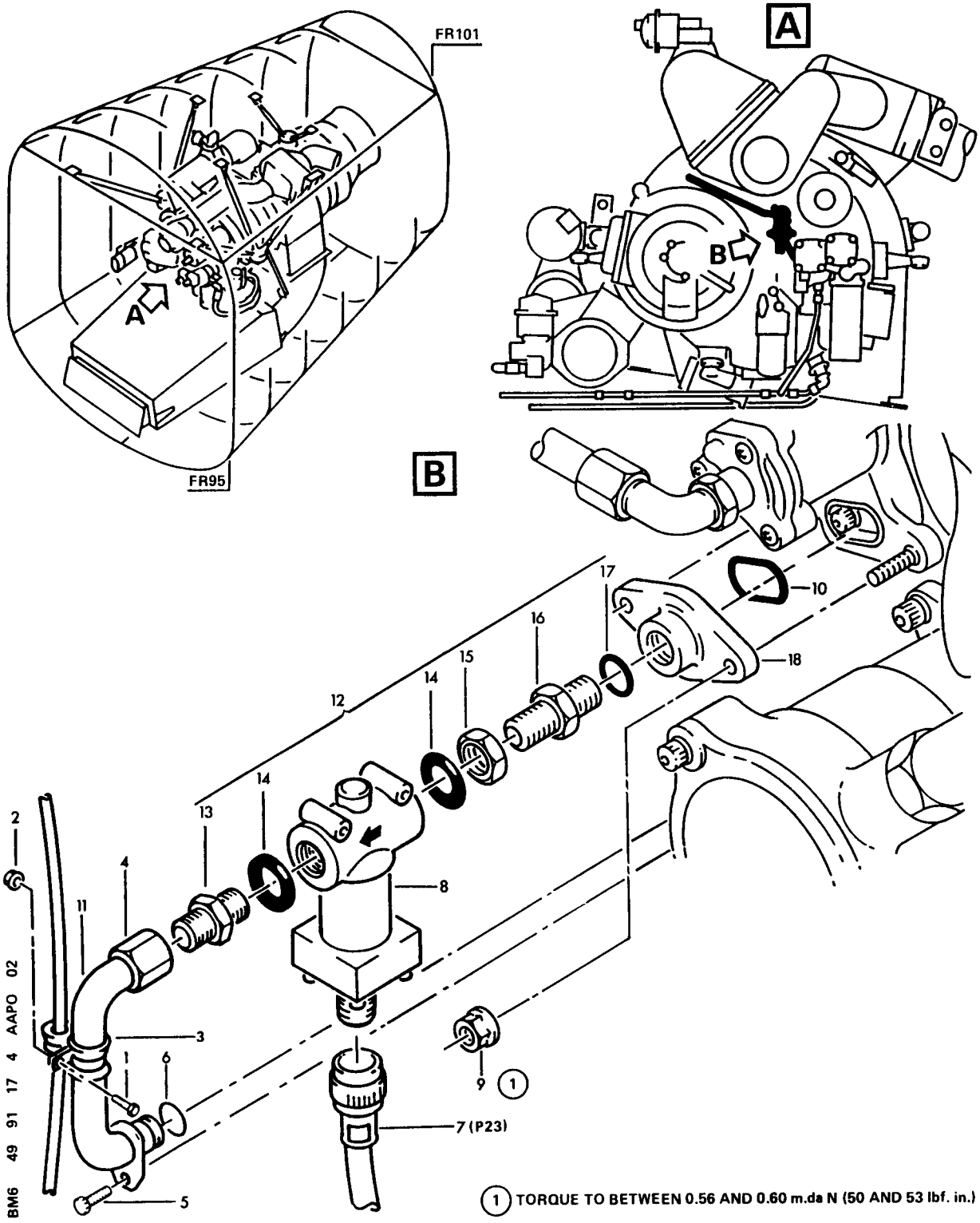
Normally Closed Solenoid (De-Oil) Valve
Figure 401

(Ref. Fig. 402)

D. Installation
(Ref. Fig. 401, 402)
(1)Remove blanking caps and plugs.
(2)Apply a thin layer of oil (Mat. No. 03-002 or 03-003) to new packing (10) and put in position.
(3)Install de-oil valve assembly (12) with nuts (9).
(4)TORQUE nuts (9) to between 0.56 and 0.60 m.daN (50 and 53 lbf.in.).
(5)Adjust de-oil valve (8) to correct position.
(6)Tighten locknut (15) to secure de-oil valve (8).
(7)Apply a thin layer of oil (Mat. No. 03-002 or 03-003) to new O-ring (6).
(8)Install new O-ring (6) onto de-oiling tube (11).
(9)Position de-oiling tube (11) with bolt (5) and nut (4).
(10)Tighten bolt (5) and nut (4).
(11)Position clamp (3) and install bolt (1) and nut (2).
(12)Remove blanking cap and plug, connect electrical connector P23 (7) to de-oil valve (8) and safety with lockwire.
(13)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

E. Test
(1)Start and operate APU (Ref. 49-00-00, P. Block 501).
(a)Check de-oil valve connections for leakage.
(b)Shut down APU (Ref. 49-00-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.



Normally Closed Solenoid (De-Oil) Valve
Figure 402

DIFFERENTIAL PRESSURE INDICATORS - REMOVAL/INSTALLATION

1. Differential Pressure Indicator - Generator Scavenge Pump Filter Housing

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Reason for the Job

(1)Wrong Indication

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(5)	Torque Wrench, up to 2.0 m.daN (177 lbf.in.)
(6)	Container 2.0 l (0.52 US gal.)
(7)	O-Rings
(8)	Dry, Filtered, Compressed Air Maximum 20 psig (1.4 bar).
(9)Material No. 03-002	Oils (Ref. 20-31-00)
or	
10)Material No. 03-003	Oils (Ref. 20-31-00)
11)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

C. Procedure

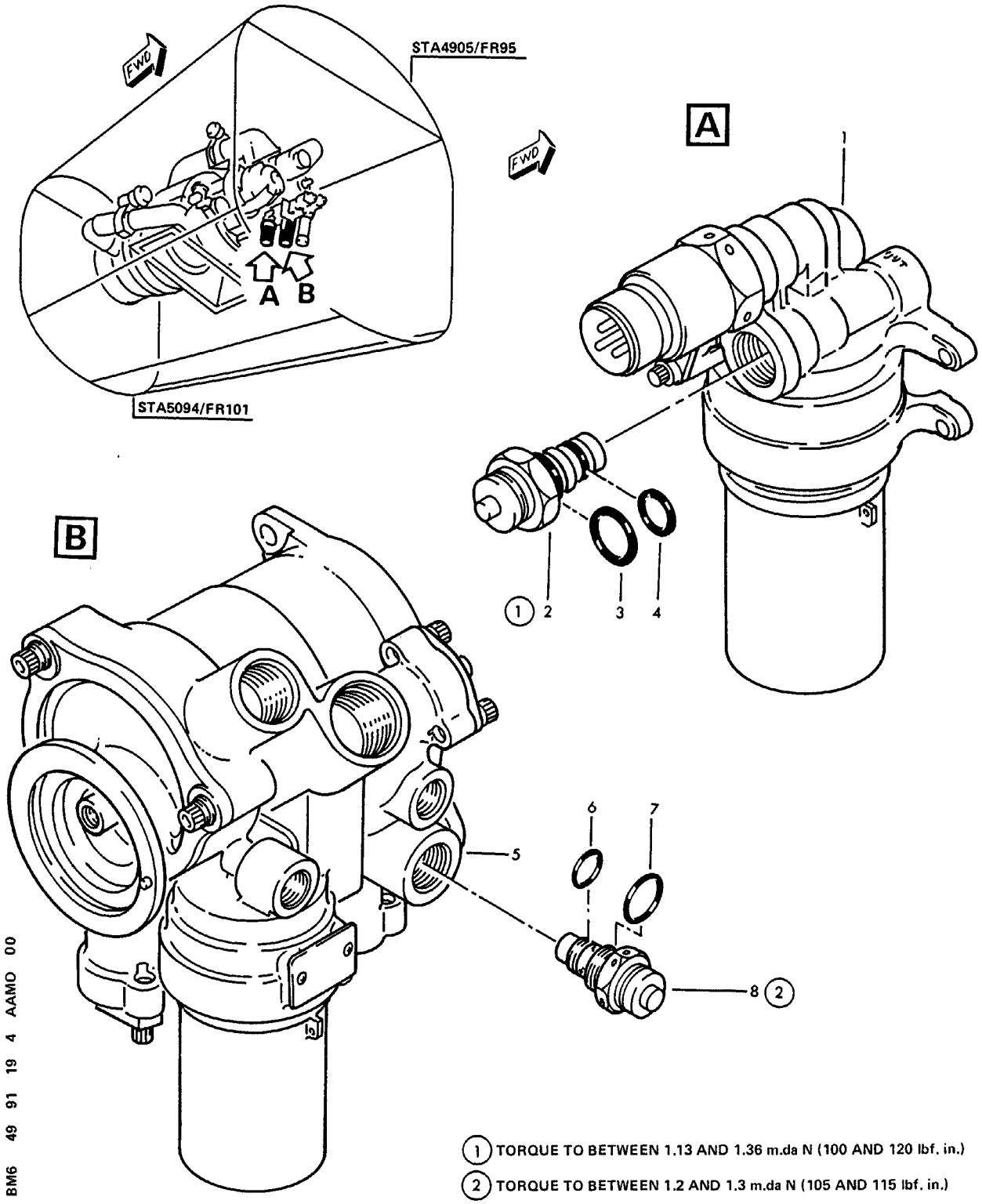
(Ref. Fig. 401)

(1)Job Set-Up

(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/SART	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.



Differential Pressure Indicators
Figure 401

(2)Removal
NOTE : Fit blanking caps and plugs to open orifices.
(a)Remove lockwire from differential pressure indicator (2).
(b)Position container.
(c)Remove differential pressure indicator (2) with O-rings (3, 4) from filter housing (1). Discard O-rings.
(3)Preparation for Installation
WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
(a)Clean differential pressure indicator (2) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(b)Visually inspect differential pressure indicator (2) for damage and cracks.
(c)Reset differential pressure indicator (2) if necessary.
(4)Installation
(a)Lubricate new O-rings (3, 4) with oil (Mat. No. 03-002 or Mat. No. 03-003).
(b)Install new O-rings (3, 4) onto differential pressure indicator (2).
NOTE : Remove blanking caps and plugs.
(c)Install assembled differential pressure indicator (2) onto filter housing (1).
(d)TORQUE differential pressure indicator (2) to between 1.13 and 1.36 m.daN (100 and 120 lbf.in.)
(e)Safety differential pressure indicator (2) with lockwire.
(f)Remove container.
(5)Test
(a)Check oil level in gearbox sump. Replenish if necessary (Ref. 12-13-49, P. Block 1).
(b)Start and operate APU (Ref. 49-10-00, P. Block 501) and check differential pressure indicator for leakage.
(c)Shut down APU (Ref. 49-10-00, P. Block 501).
(6)Close-Up
(a)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(b)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(c)Close access doors 315AL and 316AR and remove access platform.

2. Differential Pressure Indicator - Lube Pump
WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED. DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Reason for the Job
(1)Wrong Indication of Differential Pressure Indicator

B. Equipment and Material

ITEM	DESIGNATION
(1)	Access Platform 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Corrosion-Resistant Steel Lockwire 0.8 mm (0.032 in.) dia.
(5)	Torque Wrench, up to 2.0 m.daN (177 lbf.in.)
(6)	Container 2.0 l (0.52 US gal.)
(7)	O-Rings
(8)	Dry, Filtered, Compressed Air Maximum 20 psig (1.4 bar).
(9)Material No. 03-002 or	Oils (Ref. 20-31-00)
10)Material No. 03-003	Oils (Ref. 20-31-00)
11)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

C. Procedure
(Ref. Fig. 401)
(1)Job Set-Up
(a)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/AIR INTAKE FLAP	1KB	B55
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access doors 315AL and 316AR.
(2)Removal
NOTE : Fit blanking caps and plugs to open orifices.
(a)Remove lockwire from differential pressure indicator (8).
(b)Position container.
(c)Remove differential pressure indicator (8) with O-rings (6, 7) from lube pump (5). Discard O-rings.
(3)Preparation for Installation
WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
(a)Clean differential pressure indicator (8) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(b)Visually inspect differential pressure indicator (8) for damage and cracks.
(c)Reset differential pressure indicator (8) if necessary.
(4)Installation
(a)Lubricate new O-rings (6, 7) with oil (Mat. No. 03-002 or

Mat. No. 03-003).

(b)Install new O-rings (6, 7) onto differential pressure indicator (8).
NOTE : Remove blanking caps and plugs.

(c)Install assembled differential pressure indicator (8) on lube pump (5). TORQUE differential pressure indicator (8) to between 1.2 and 1.3 m.daN (105 and 115 lbf.in.).

(d)Safety differential pressure indicator (8) with lockwire.

(e)Remove container.

(5)Test

(a)Check oil level in gearbox sump. Replenish if necessary (Ref. 12-13-49, P. Block 1).

(b)Start and operate APU (Ref. 49-10-00, P. Block 501) and check differential pressure indicator for leakage.

(c)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up

(a)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.

(b)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

(c)Close access doors 315AL and 316AR and remove access platform.

R DIFFERENTIAL PRESSURE SWITCH

REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT (MAT. NO. 11-002).
THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST, PROTECT EYES AND SKIN.
APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Reason for the Job

R ** NOTE : The following procedure is applicable only before
R GARRETT SB GTCP 331-49-5692

A. Differential pressure switch inoperative

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
D.	Torque Wrench, up to 2.0 m.daN (177 lbf.in.)
E.	Circuit Breaker Safety Clips and Tags
F.	Container
G.	Dry, Filtered, Compressed Air Maximum 20 psig (1.4 bar)
H.	O-Rings
J. Material No. 03-002	Oils (Ref. 20-31-00)
or	
K. Material No. 03-003	Oils (Ref. 20-31-00)
L. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

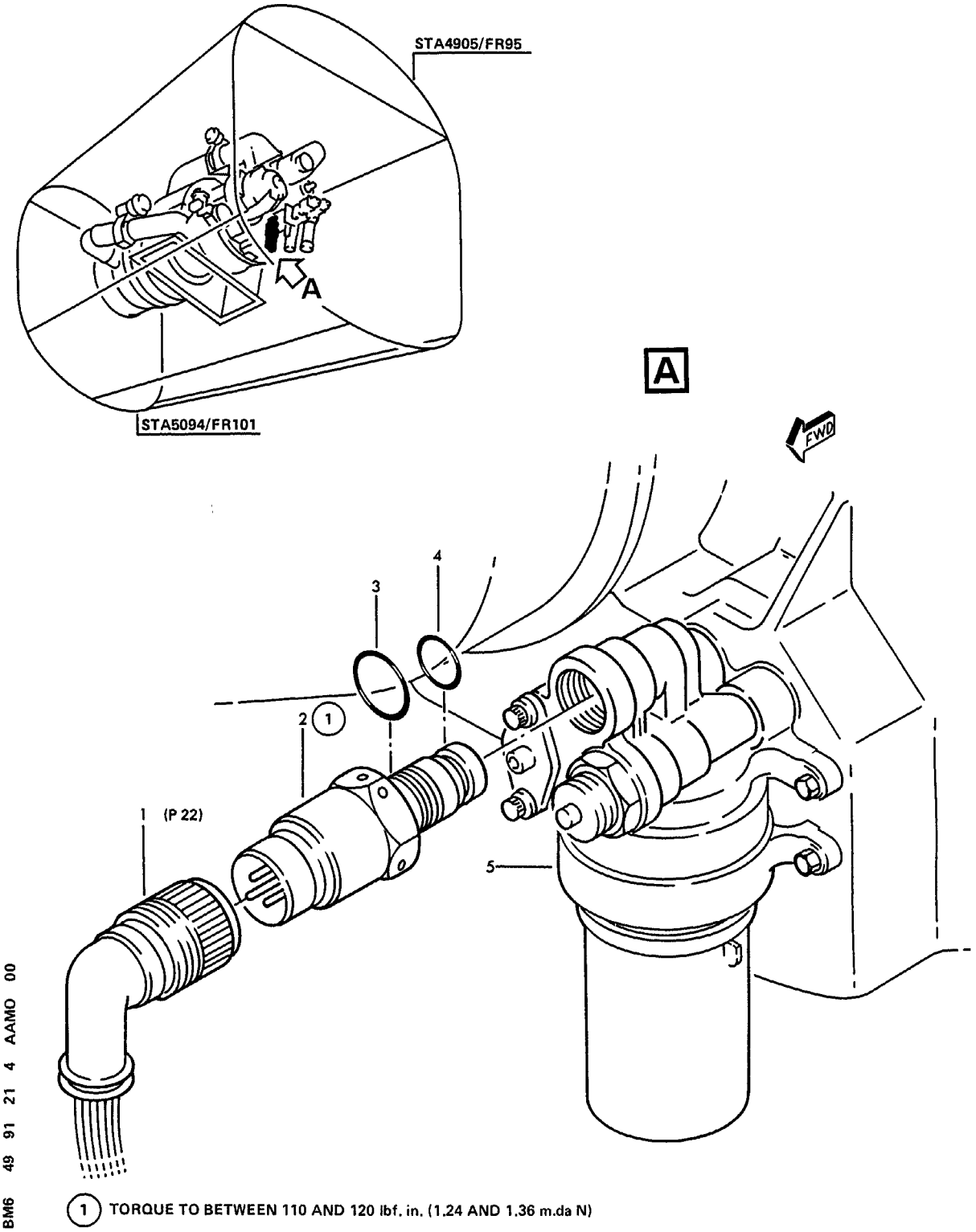
3. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK/CTL	71KD	B53

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.



Differential Pressure Switch
Figure 401

B. Removal
(1)Cut and remove lockwire from electrical connector P22 (1).
(a)Disconnect electrical connector P22 (1).
(2)Remove lockwire from differential pressure switch (2).
(3)Position container.
(4)Remove differential pressure switch (2) with O-rings (3, 4) from filter housing (5). Discard O-rings.
(5)Fit blanking caps and plugs to all orifices and electrical connector.

C. Preparation for Installation
WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
(1)Clean differential pressure switch (2) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Visually inspect differential pressure switch (2) for damage and cracks.

D. Installation
(1)Lubricate new O-rings (3, 4) with oil (Mat. No. 03-002 or 03-003).
(2)Install new O-rings (3, 4) onto differential pressure switch (2).
(3)Remove blanking caps and plugs.
(4)Install assembled differential pressure switch (2) into filter housing (5). TORQUE differential pressure switch (2) to between 1.24 and 1.36 m.daN (110 and 120 lbf.in.)
(5)Connect electrical connector P22 (1) onto differential pressure switch (2).
(6)Safety differential pressure switch (2) and electrical connector with lockwire.
(7)Remove container.

E. Test
(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(2)Check differential pressure switch for leakage.
(3)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.
(3)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

FILTER PRESSURE REGULATING BYPASS AND OIL PRESSURE REGULATING VALVES REMOVAL / INSTALLATION

1. Filter Pressure Regulating Bypass Valve Generator Scavenge Pump Filter Housing

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Reason for the Job

(1)Filter pressure regulating bypass valve of generator scavenge pump inoperative.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Torque Wrench, up to 1.0 m. daN (88,5 lbf. in.)
(5)	Container 2.0 l (0.52 US gal.)
(6)	O-Rings
(7)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(8)	Dry, Filtered, Compressed Air Maximum 20 psig (1.4 bar)
(9)Material No. 03-002 or	Oils (Ref. 20-31-00)
10)Material No. 03-003	Oils (Ref. 20-31-00)
11)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure - 49-10-00, P. Block 501	Power Plant

C. Procedure

(Ref. Fig. 401)

(1)Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK/CTL	71KD	B53

(b)Position access platform and open access doors 315AL and 316AR.

(2)Removal

(a)Position container.

(b)Cut and remove lockwire from bolts (1).

(c)Remove bolts (1) and washers (2) from regulating valve (3).

(d)Remove filter pressure regulating bypass valve (3) from filter housing assembly (4).

(e)Remove O-rings (5, 6) from pressure regulating valve (3).

(f)Discard O-rings.

(g)Fit blanking caps and plugs to orifices.

(3)Preparation for Installation

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(a)Clean pressure regulating valve (3) using cleaning agent (Mat. No. 11-002) and dry compressed air.

(b)Visually inspect pressure regulating valve (3) for damage and cracks.

(4)Installation

(a)Remove blanking caps and plugs.

(b)Lubricate new O-rings (5, 6) with oil (Mat. No. 03-002 or 03-003).

(c)Install new O-rings (5, 6) onto pressure regulating valve (3).

(d)Install assembled filter pressure regulating bypass valve (3) into filter housing (4) with washers (2) and bolts (1).

(e)TORQUE bolts (1) to between 0.28 and 0.34 m.daN (25 and 30 lbf.in.).

(f)Safety bolts (1) with lockwire.

(g)Remove container.

(5)Test

(a)Start and operate APU (Ref. 49-10-00, P. Block 501) and check pressure regulating valve for leakage.

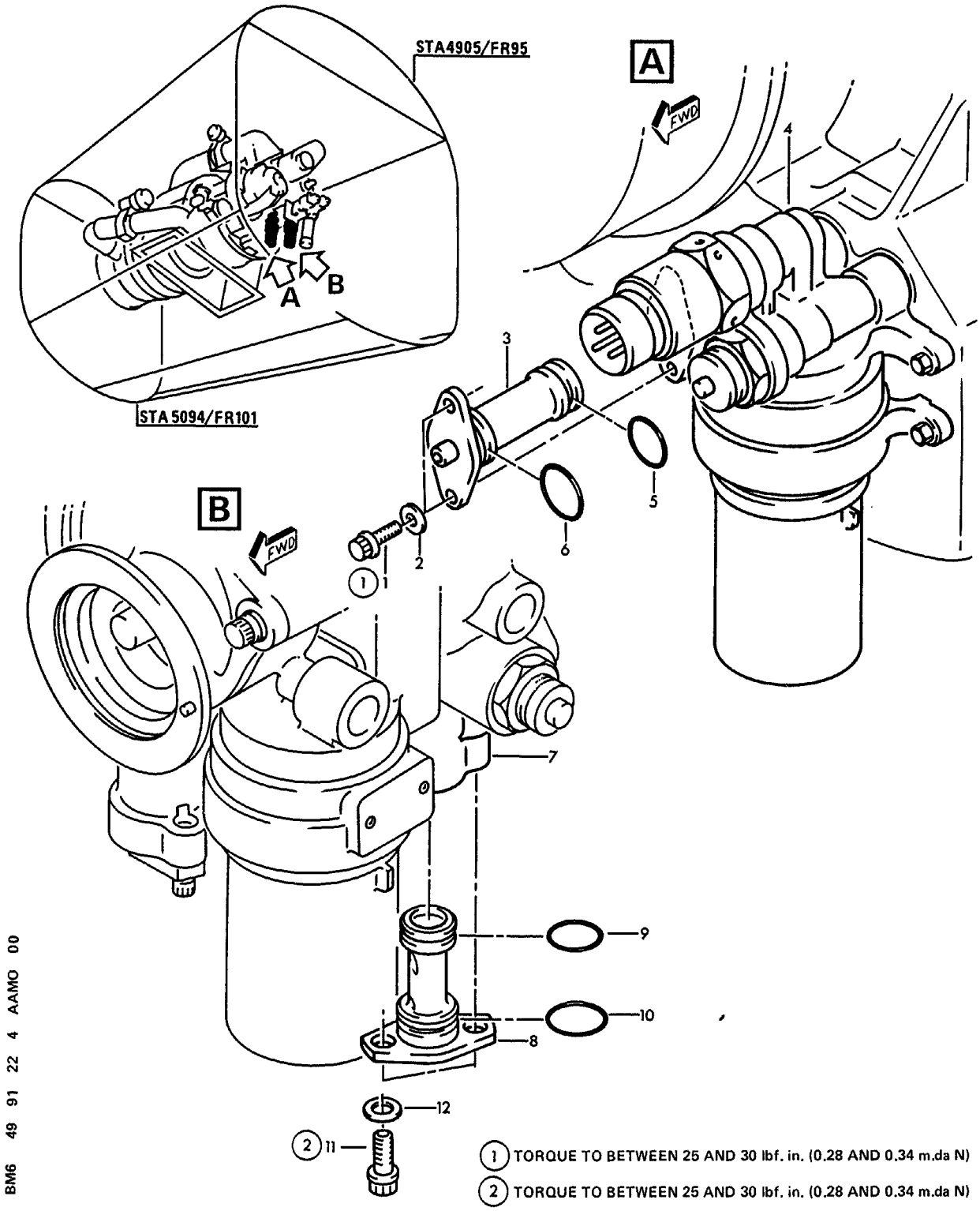
(b)Shut down APU (Ref. 49-10-00, P. Block 501).

(6)Close-Up

(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(b)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

(c)Close access doors 315AL and 316AR and remove access platform.



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Filter Pressure Regulating Bypass and
Oil Pressure Regulating Valve
Figure 401

2. Oil Pressure Regulating Valve - Lube Pump

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT NO. 11-002.
THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN. APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

A. Reason for the Job

(1)Oil pressure regulating valve of lube pump inoperative.

B. Equipment and Material

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Torque Wrench, up to 1.0 m.daN (88.5 lbf. in.)
(5)	Container 2.0 l (0.52 US gal.)
(6)	O-Rings
(7)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(8)	Dry Filtered, Compressed Air Maximum 20 psig (1.4 bar)
(9)Material No. 03-002 or	Oils (Ref. 20-31-00)
10)Material No. 03-003	Oils (Ref. 20-31-00)
11)Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedure	
- 49-10-00, P. Block 501	Power Plant

C. Procedure
(Ref. Fig. 401)
(1)Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK/CTL	71KD	B53

(b)Position access platform and open access doors 315AL and 316AR.
(2)Removal
(a)Position container.
(b)Cut and remove lockwire from bolts (11).
(c)Remove bolts (11) and washers (12) from regulating valve (8).
(d)Remove pressure regulating valve (8) from lube pump assembly (7).
(e)Remove O-rings (9,10) from pressure regulating valve (8).
(f)Discard O-rings.
(g)Fit blanking caps and plugs to orifices.
(3)Preparation for Installation
WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.
(a)Clean pressure regulating valve (8) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(b)Visually inspect pressure regulating valve (8) for damage and cracks.
(4)Installation
(a)Remove blanking caps and plugs.
(b)Lubricate new O-rings (9,10) with oil (Mat. No. 03-002 or 03-003).
(c)Install new O-rings (9, 10) onto pressure regulating valve (8).
(d)Install assembled pressure regulating valve (8) into lube pump housing assembly (7) with washers (12) and bolts (11).
(e)TORQUE bolts (11) to between 0.28 and 0.34 m.daN (25 and 30 lbf.in.).
(f)Safety bolts (11) with lockwire.
(g)Remove container.
(5)Test
(a)Start and operate APU (Ref. 49-10-00, P. Block 501) and check pressure regulating valve for leakage.
NOTE : Leakage is not permissible.
(b)Shut down APU (Ref. 49-10-00, P. Block 501).
(6)Close-Up
(a)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(b)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(c)Close access doors 315AL and 316AR and remove access platform.

OIL INDICATING - DESCRIPTION AND OPERATION

1. General

The oil indicating system is designed to sense and monitor the APU oil level. The system consists of an Oil Level Indicator 50KK and an oil level transmitter. Static and dynamic operating modes are provided in order to compensate for the change in sump oil level during APU running.

2. Component Location

R **ON A/C 001-100,

(Ref. Fig. 001)

R **ON A/C 101-200,

(Ref. Fig. 002)

R **ON A/C ALL

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	OIL LEVEL TRANSMITTER		315	315AL	49-93-16
			316	316AR	
50KK	INDICATOR-OIL LEVEL	472VU	212		
51KA	RELAY-60%	282VU	121	132AZ	

3. Description

(Ref. Fig. 003)

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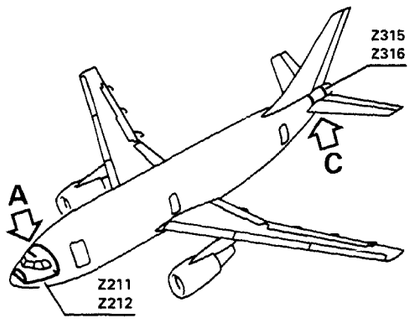
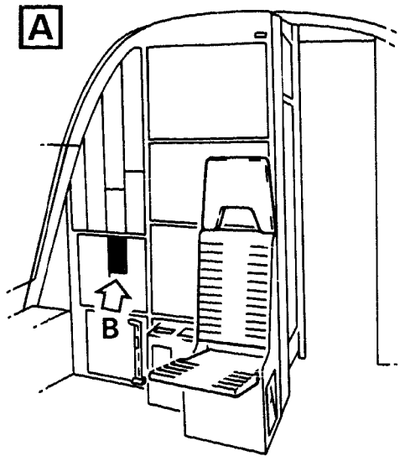
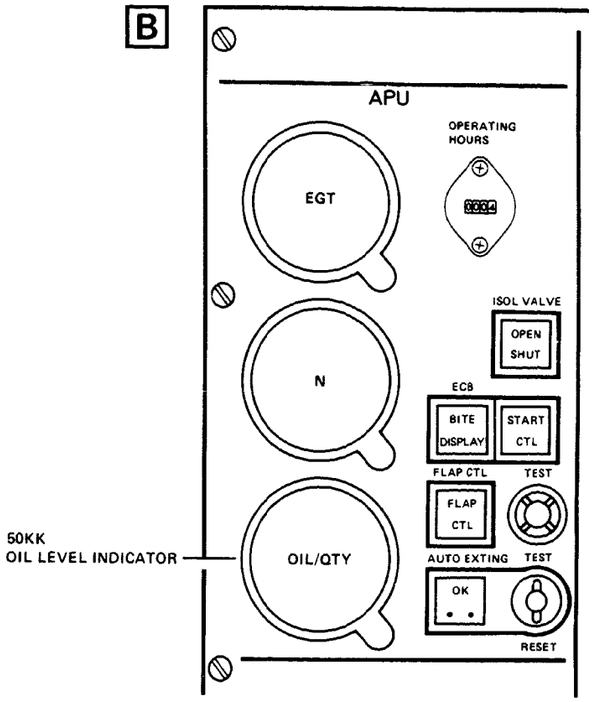
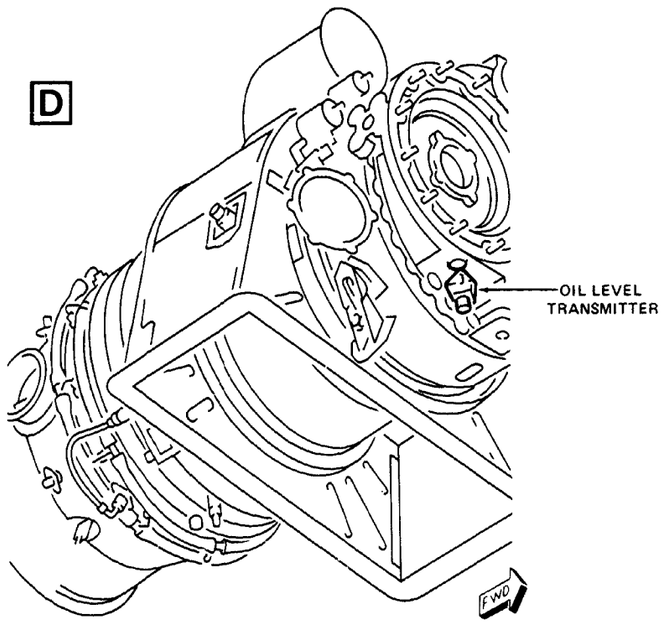
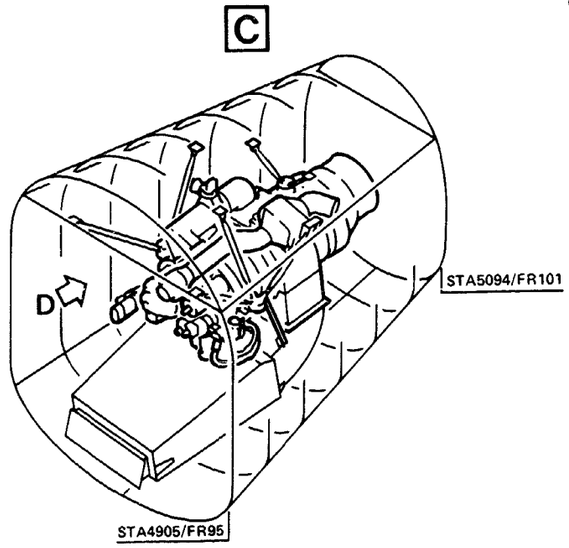






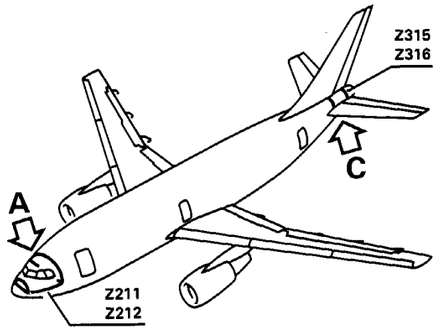
APU MAINTENANCE PANEL 472VU

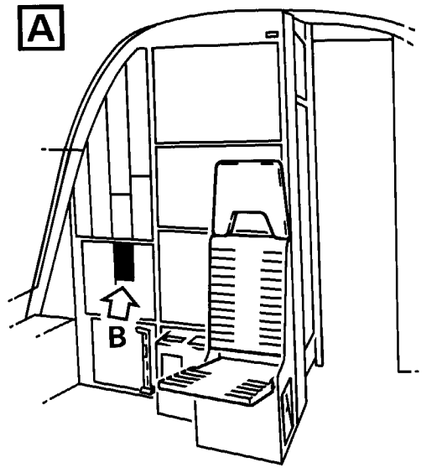


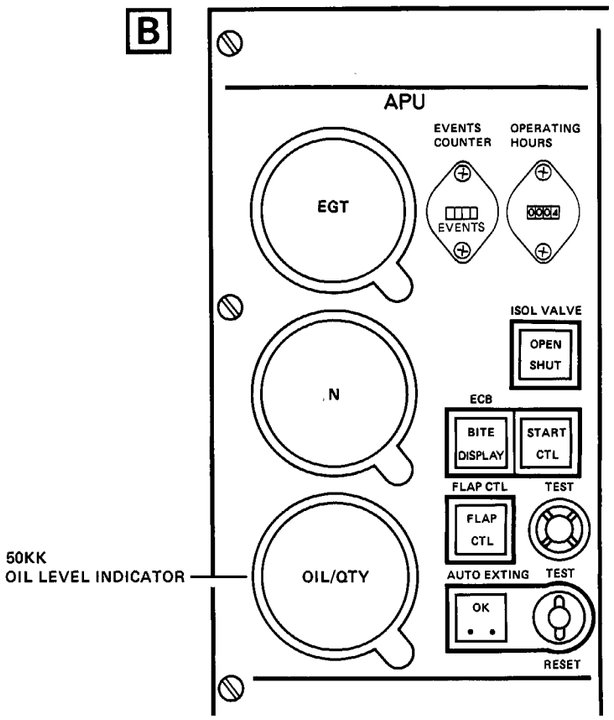


BM6 49 93 00 0AA P 0-13

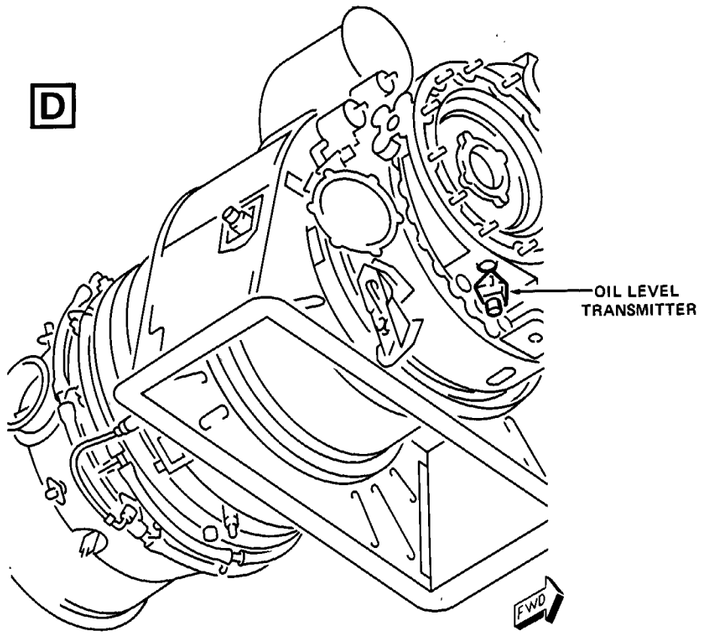
Oil Indicating
Figure 001

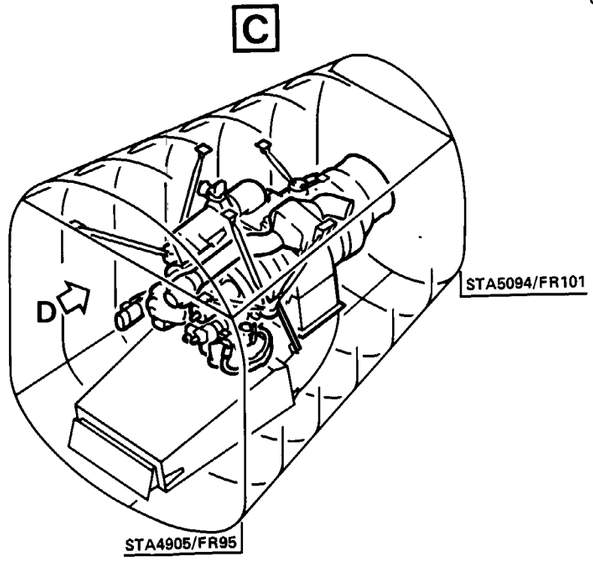




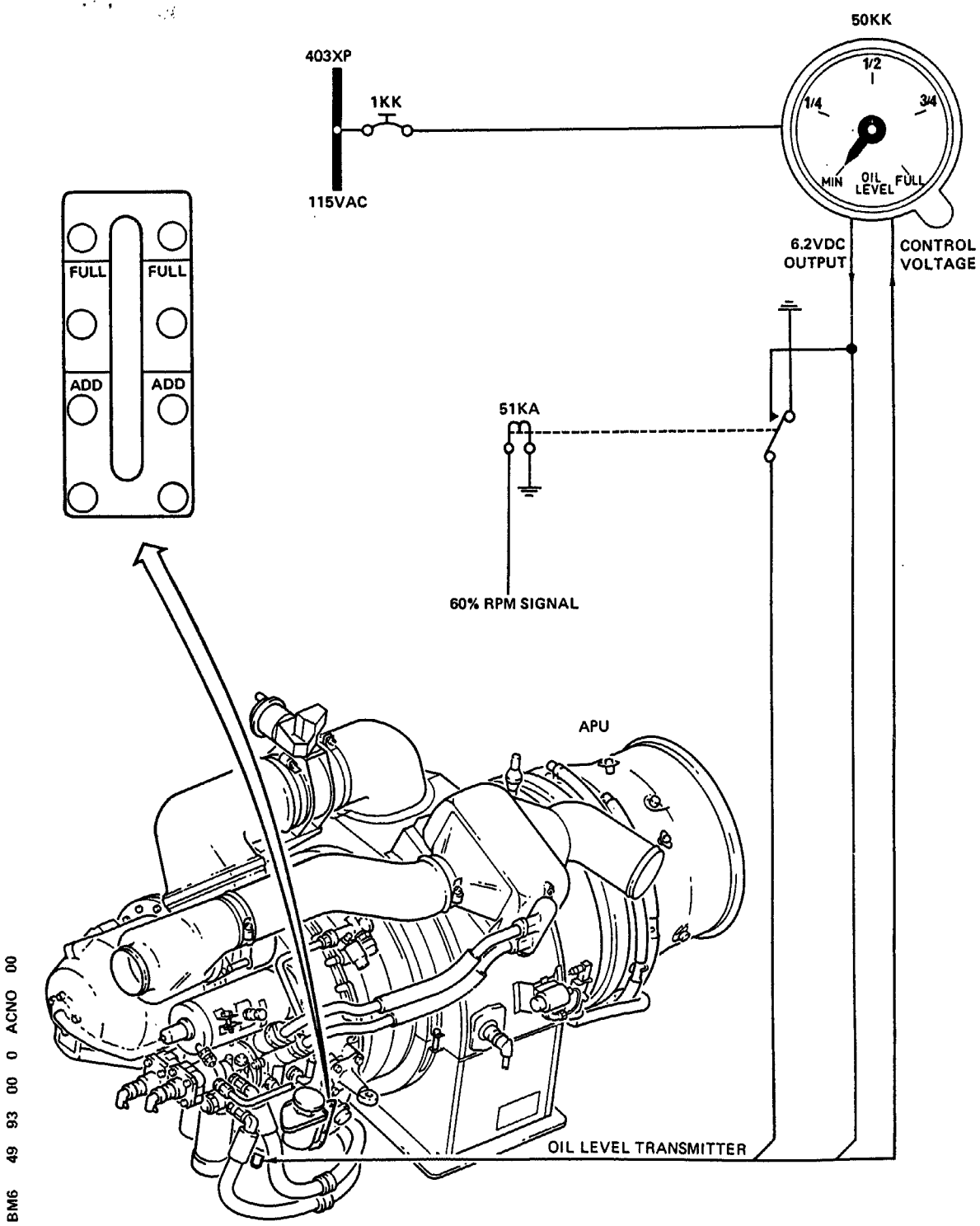


APU MAINTENANCE PANEL 472VU





Oil Indicating
Figure 002



Oil Level Indication - Block Diagram
Figure 003

The oil level indicating system consists of an oil level transmitter and indicator. The transmitter is installed so that it protrudes into the APU sump to monitor the sump oil level. The indicator is installed in maintenance panel 472VU and provides an indication of oil level from MIN to FULL divided into four quarters. Because, during APU running, the oil level in the sump will be less than when the APU is not running the transmitter has a DYNAMIC and a STATIC operating mode.

A. The oil level transmitter consists of a resistance network and magnetic float switches. Five float-operated switches provide the resistance selection to produce an output signal in discrete steps to operate the oil level indicator. Switches 1-3 are used in the static-operation mode and switches 3-5 are used in the dynamic-operation mode. The transmitter is supplied with a constant 6.2 V DC from the oil level indicator.

B. The oil level indicator 50KK is a galvanometer instrument with a dial calibrated to indicate the oil level in the system. The dial is illuminated by integral lighting. The indicator is supplied with 115 V AC 400 Hz, and produces a constant 6.2 V DC output supplied to the transmitter. The transmitter feeds a signal voltage from 0 V (MIN) to 6.14 V (FULL) in five discretes steps back to the indicator.

C. The APU 60%-relay provides the input voltage switching to enable the oil level transmitter to operate in a static or dynamic operating mode.

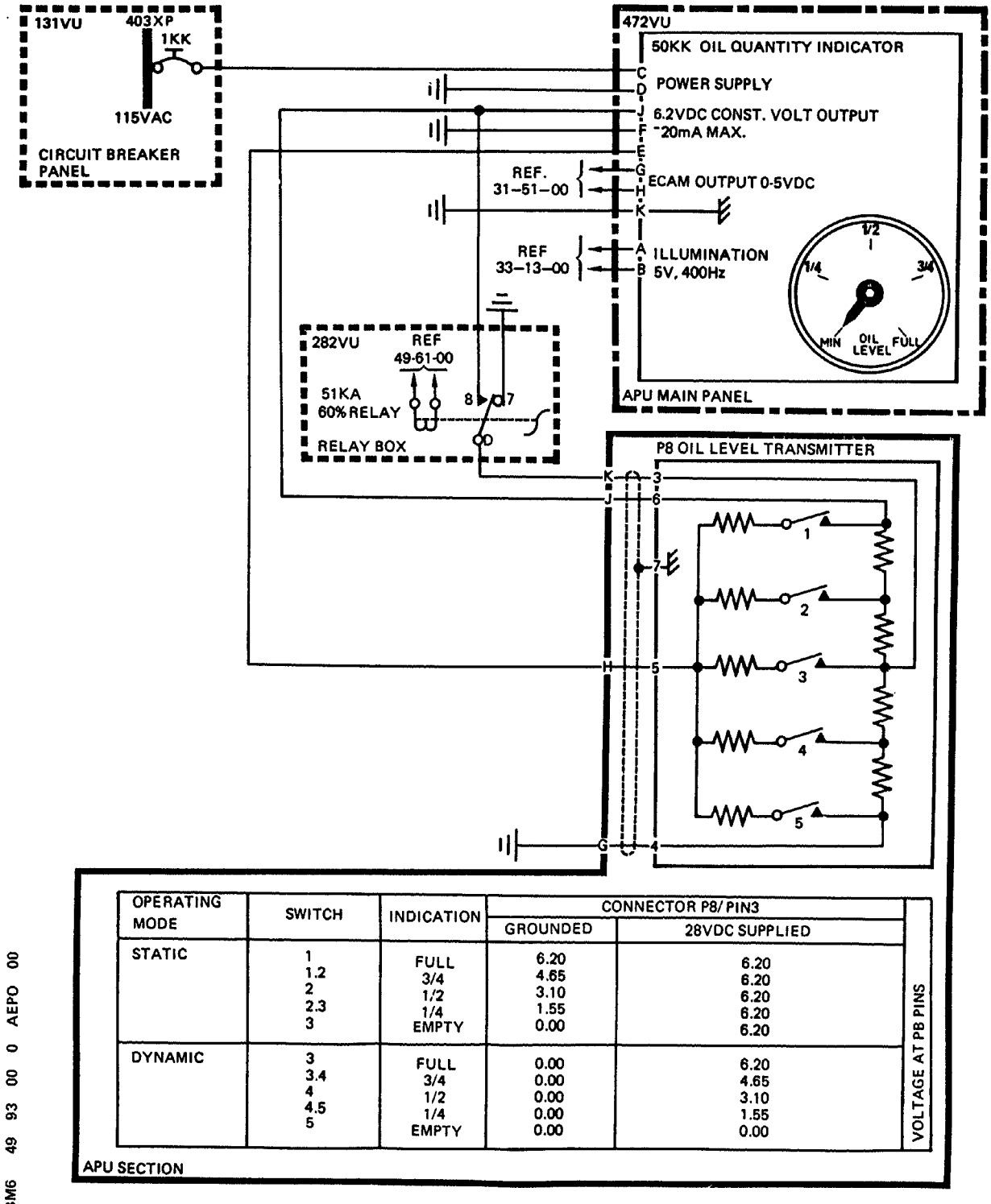
4. Operation

A. With busbar 403XP energized and circuit breaker 1KK APU IND OIL QTY closed, the oil level indicator 50KK is supplied with 115 V AC and the indicator supplies terminal 6 of the transmitter with 6.2 V DC. Terminal 3 of the transmitter is grounded via the APU 60%-relay 51KA.

B. Static Operation Mode
With a full quantity of oil in the APU sump, switch 1 in the oil transmitter causes the resistance network to provide maximum input voltage to be supplied to the indicator control circuit and the indicator will show a FULL indication. As the oil level in the sump falls, switch 1 and 2 together change the value of the resistance network reducing the input voltage to the indicator control circuit, and the indicator will show a 3/4 indication. A table of all switch positions and outputs is provided in the system schematic.

C. Dynamic Operation Mode
With a full quantity of oil in the APU sump when the APU starts to run, the oil circulates throughout the APU lubrication system and the oil level in the sump falls. As the APU reaches 60% of its full running speed, relay 51KA energizes and switches the potential at oil transmitter terminal 3 from ground to 6.2 V DC. This enables the input voltage supplied to the indicator to remain at maximum so that the indicator continues to show a FULL indication. The switch positions and relative outputs are shown in the system schematic.

(Ref. Fig. 004)



OPERATING MODE	SWITCH	INDICATION	CONNECTOR P8/PIN3	
			GROUNDED	28VDC SUPPLIED
STATIC	1	FULL	6.20	6.20
	1.2	3/4	4.65	6.20
	2	1/2	3.10	6.20
	2.3	1/4	1.55	6.20
	3	EMPTY	0.00	6.20
DYNAMIC	3	FULL	0.00	6.20
	3.4	3/4	0.00	4.65
	4	1/2	0.00	3.10
	4.5	1/4	0.00	1.55
	5	EMPTY	0.00	0.00

VOLTAGE AT P8 PINS

APU SECTION

BM6 49 93 00 0 AEPD 00

Oil Level Indication - Schematic
Figure 004

1. Read APU Oil Level on Lateral Panel Indicator

A. Reason for the Job

R Check oil level quantity on lateral panel.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz,
Referenced Procedure	
- 24-41-00, P. Block 301	AC External Power Control
- 12-13-49, P. Block 1	APU - Replenishing

C. Procedure

(1)Job Set-Up

(a)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(b)Make certain that electronics racks ventilation is correct.

(c)Make sure that the following circuit breakers is closed:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/IND/OIL QTY	50KA	E70

(d)On the overhead panel 429VU, put the APU MASTER SW to the ON position.

(2)Readout of the APU oil level indicator

**ON A/C 101-200,

(Ref. Fig. 601)

**ON A/C 001-100,

(Ref. Fig. 602)

**ON A/C ALL

(a)Read the position of the pointer of the oil level indicator.

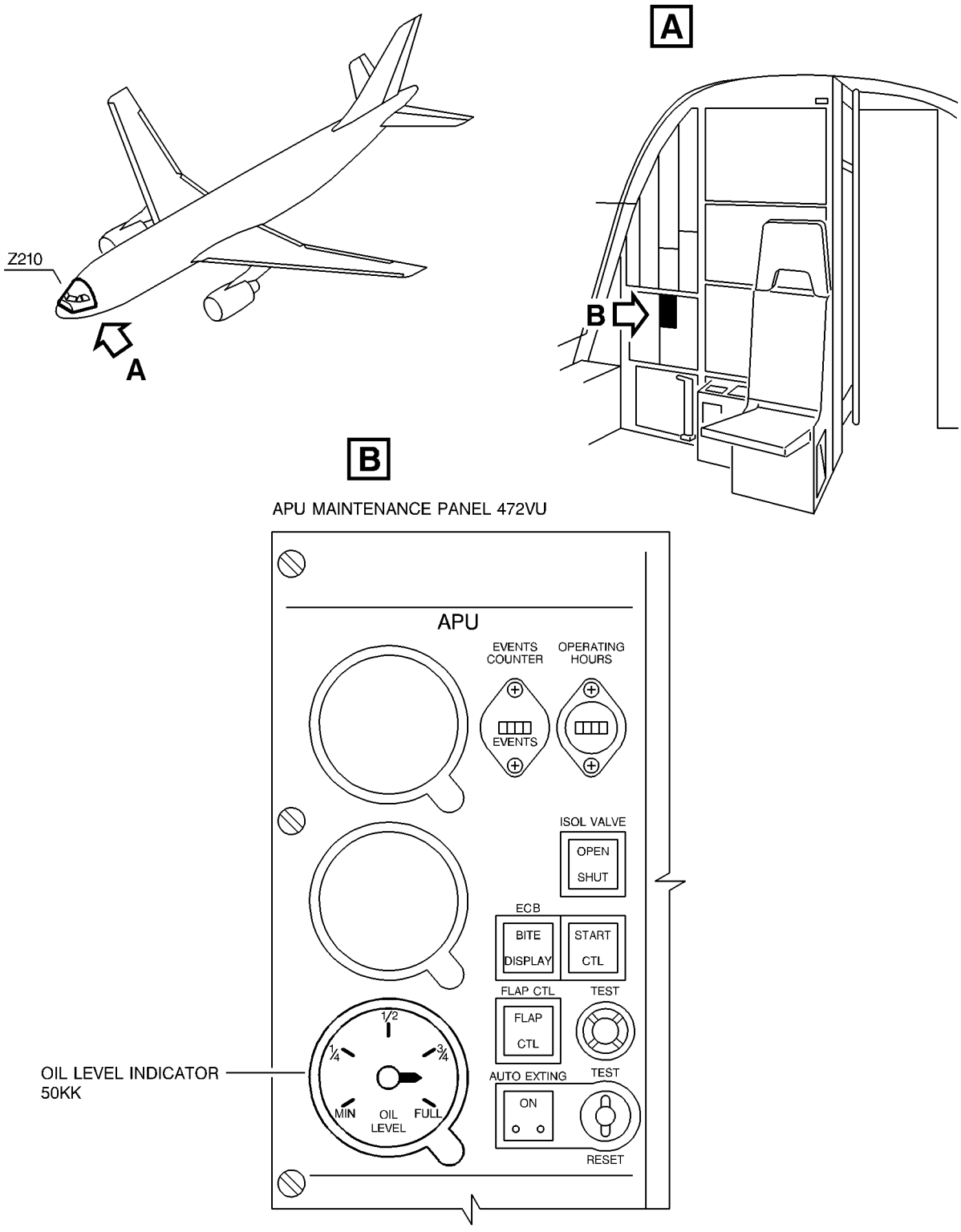
(b)Make sure that the pointer is not below the MIN indication.

(c)Obey the guidelines of the in service oil consumption (Ref. Fig. 603).

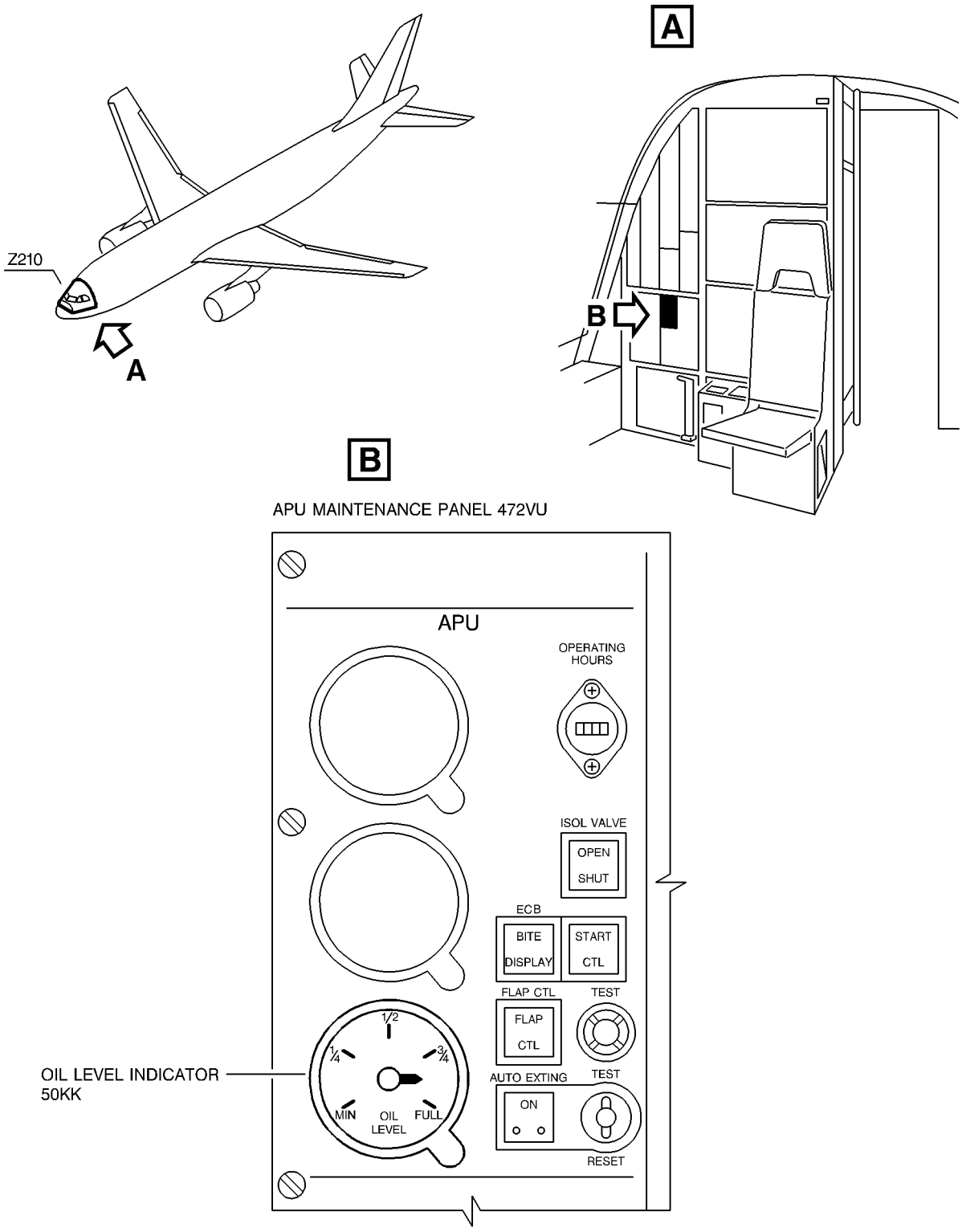
(d)Replenish oil, if the level is not within the limits (Ref. 12-13-49, P. Block 1).

(3)Close-Up

(a)On the overhead panel 429VU, put the APU MASTER SW to the OFF

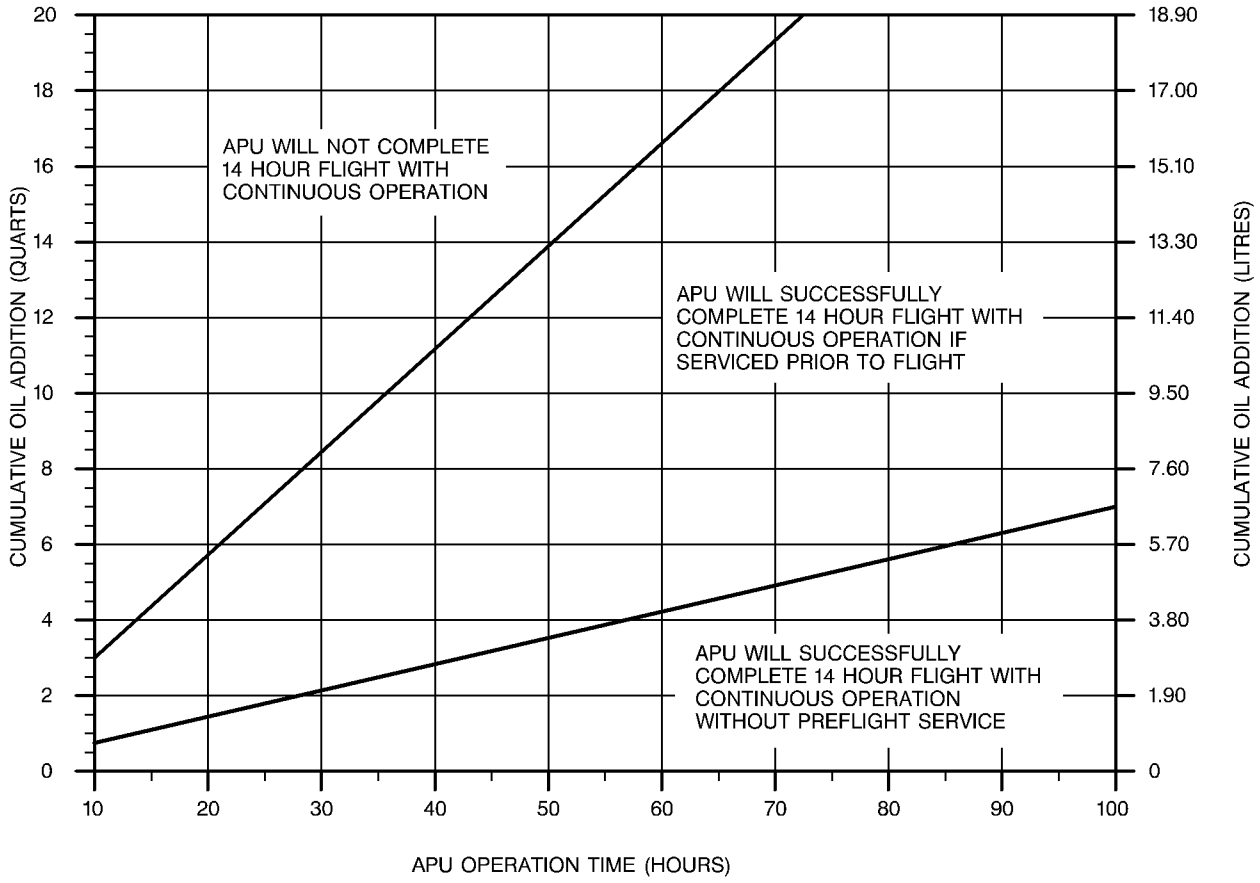


Oil Indicating
Figure 601



Oil Indicating
Figure 602

GTCP331 INSTALLED APU
IN-SERVICE OIL CONSUMPTION GUIDELINES



OPERATING TIME PERIOD DURING WHICH OIL
WAS ADDED TO APU AS NOTED ON VERTICAL SCALE

BM6 49 93 00 6 ACM0 00

In Service Oil Consumption Guidelines
Figure 603

position.

(b) De-energize aircraft electrical network and disconnect electrical ground power unit.

OIL FILLER AND SIGHT GLASS HOUSING - REMOVAL/INSTALLATION

WARNING : FOR BEST RESULTS, APU MUST BE AT OPERATING TEMPERATURE BEFORE DRAINING OIL. USE EXTREME CARE WHEN WORKING ON OR NEAR HOT ENGINE. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT MAT. NO. 11-002. THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE. MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
DO NOT INHALE FUMES, MIST OR DUST. PROTECT EYES AND SKIN.
APPLY ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
FIRE PROTECTION REGULATIONS MUST BE OBSERVED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Circuit Breaker Safety Clips and Tags
C.	Torque Wrench, up to 3.00 m.daN (250 lbf.in.)
D.	Corrosion-Resistant Steel Lockwire, 0.6 mm (0.020 in.) dia.
E.	O-Rings
F. Material No. 03-002	Oils (Ref. 20-31-00)
or	
G. Material No. 03-003	Oils (Ref. 20-31-00)
H. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 49-10-00, P. Block 501	Power Plant
- 49-90-00, P. Block 301	Oil
- 49-91-13, P. Block 201	Magnetic Drain Plug

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

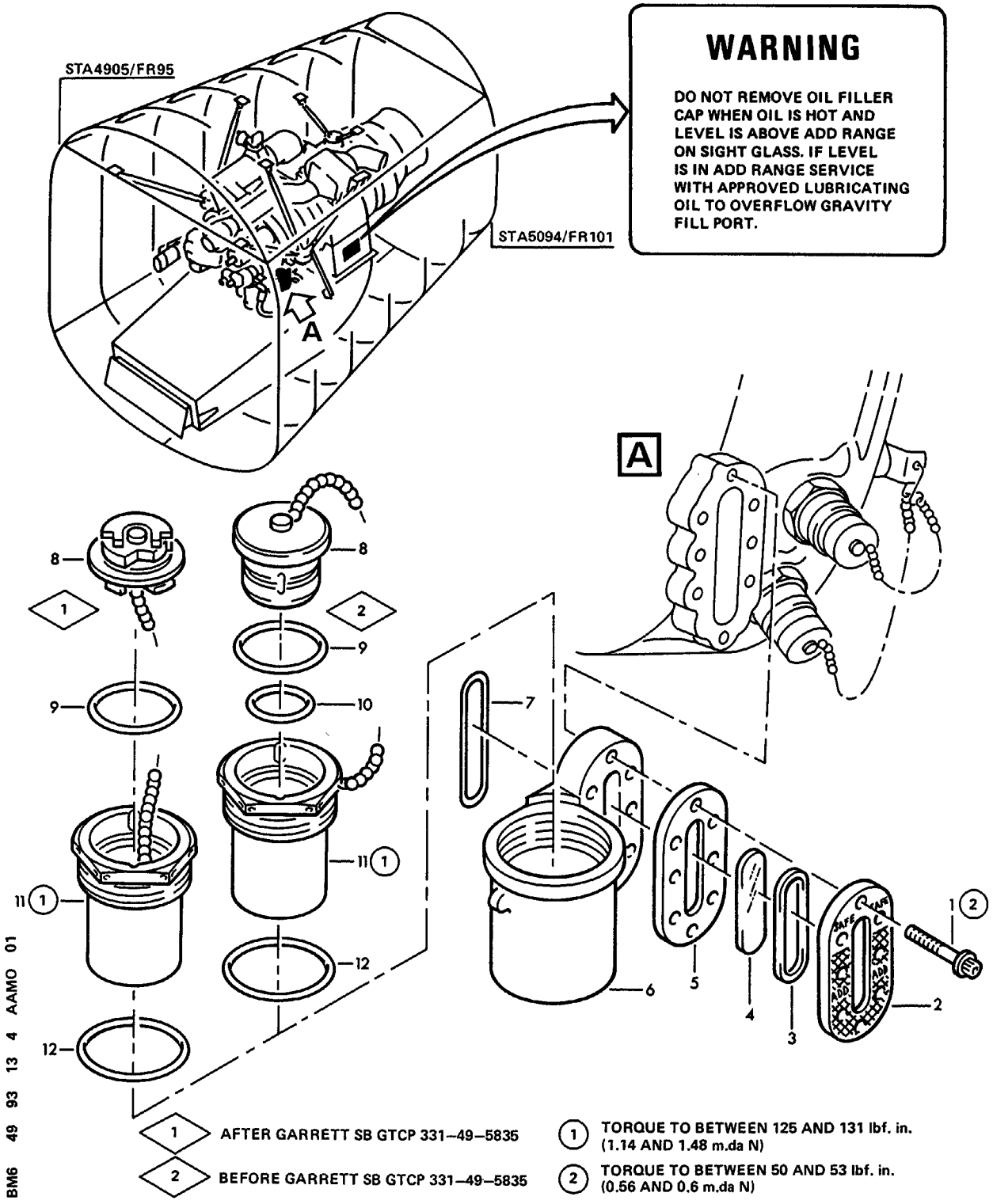
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

B. Removal
(Ref. Fig. 401)
WARNING : FOR BEST RESULTS, APU MUST BE AT OPERATING TEMPERATURE BEFORE DRAINING OIL. USE EXTREME CARE WHEN WORKING ON OR NEAR HOT ENGINE. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.
(1)Remove magnetic drain plug and drain oil (Ref. 49-91-13, P. Block 201).
(2)Install magnetic drain plug (Ref. 49-91-13, P. Block 201).
(3)Cut and remove lockwire from filler screen (11).
(4)Remove oil filling cap (8).
NOTE : Cap (8) must be depressed during rotation.
(5)Remove filler screen (11) from filler and sight glass housing (6).
CAUTION : MAKE CERTAIN, THAT SIGHT GLASS ASSEMBLY IS NOT DAMAGED.
(6)Remove bolts (1), sight glass housing (2), gasket (3), window (4), reflector (5), filler and sight glass housing (6) and O-ring (7) from gear box.
(7)Discard gasket (3) and O-ring (7).

C. Preparation for Installation
(1)Remove and discard O-rings (9, 10, 12) or O-rings (9, 12).
WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
(2)Clean sight glass housing assembly using cleaning agent (Mat. No. 11-002).
(3)Check sight glass housing (2) for damage. Replace if necessary.
(4)Check window (4) for transparency and damage. Replace if necessary.
(5)Check reflector (5) for damage. Replace if necessary.
(6)Check filler and sight glass housing (6) for damage. Replace if necessary.
(7)Check cap (8) and lockpins or lugs for damage. Replace if necessary.
(8)Check sight glass installation flange on gearbox for damage.
(9)Lubricate new O-rings (9, 10, 12) or O-rings (9, 12) with oil (Mat. No. 03-002 or 03-003).
(a)Install new O-rings (9, 10) or O-ring (9) onto cap (8).
(b)Install new O-ring (12) on filler screen (11).

D. Installation
(1)Lubricate new O-ring (7) with oil (Mat. No. 03-002 or 03-003).
(2)Position new O-ring (7), filler and sight glass housing (6),


STA4905/FR95
STA5094/FR101
A
WARNING
DO NOT REMOVE OIL FILLER CAP WHEN OIL IS HOT AND LEVEL IS ABOVE ADD RANGE ON SIGHT GLASS. IF LEVEL IS IN ADD RANGE SERVICE WITH APPROVED LUBRICATING OIL TO OVERFLOW GRAVITY FILL PORT.
A
1 AFTER GARRETT SB GTCP 331–49–5835
2 BEFORE GARRETT SB GTCP 331–49–5835
1 TORQUE TO BETWEEN 125 AND 131 lbf. in. (1.14 AND 1.48 m.da N)
2 TORQUE TO BETWEEN 50 AND 53 lbf. in. (0.56 AND 0.6 m.da N)
BM6 49 93 13 4 AAMO 01

Oil Filler and Sight Glass Housing
Figure 401

reflector (5), window (4), gasket (3) and sight glass housing (2) onto gearbox and install bolts (1).

NOTE : Make certain, that the components of sight glass housing assembly are positioned in correct sequence.

(a)TORQUE bolts (1) to between 0.56 and 0.60 m.daN (50 and 53 lbf.in.).

(3)Install filler screen (11) into filler and sight glass housing (6).

(a)TORQUE filler screen (11) to between 1.41 and 1.48 m.daN (125 and 131 lbf.in.).

(4)Install cap (8).

NOTE : Cap (8) must be depressed during rotation.

(5)Safety filler screen (11) with lockwire.

(6)Replenish oil system (Ref. 49-90-00, P. Block 301).

(7)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

B. Removal

(Ref. Fig. 402)

WARNING : FOR BEST RESULTS, APU MUST BE AT OPERATING TEMPERATURE BEFORE DRAINING OIL. USE EXTREME CARE WHEN WORKING ON OR NEAR HOT ENGINE. MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.

(1)Remove magnetic drain plug and drain oil (Ref. 49-91-13, P. Block 201).

(2)Install magnetic drain plug (Ref. 49-91-13, P. Block 201).

(3)Cut and remove lockwire from filler screen (11).

(4)Disconnect oil filling cap (8).

NOTE : Cap (8) must be depressed during rotation.

(5)Remove filler screen (11) and oil drain scupper (13) from filler and sight glass housing (6).

CAUTION : MAKE CERTAIN, THAT SIGHT GLASS ASSEMBLY IS NOT DAMAGED.

(6)Remove bolts (1, 2), sight glass housing (3) and discard O-ring (4).

(7)Remove bolt (5), filler and sight glass housing (6) and discard O-ring (7).

C. Preparation for Installation

(1)Remove and discard O-rings (9, 10, 12) or O-rings (9, 12).

WARNING : CLEANING AGENT MAT. NO. 11-002 IS DANGEROUS.

(2)Clean sight glass housing assembly using cleaning agent (Mat. No. 11-002).

(3)Check sight glass housing (3) for damage.

(a)Check the integrated window for transparency and damage. Replace sight glass housing (3) if necessary.

(4)Check filler and sight glass housing (6) for damage. Replace if necessary.

(5)Check cap (8) and lockpins or lugs for damage. Replace if necessary.

(6)Check oil drain scupper (13) for damage. Replace if necessary.

(7)Check sight glass installation flange on gearbox for damage.

(8)Lubricate new O-rings (9, 10, 12) or O-rings (9, 12) with oil (Mat. No. 03-002 or 03-003).

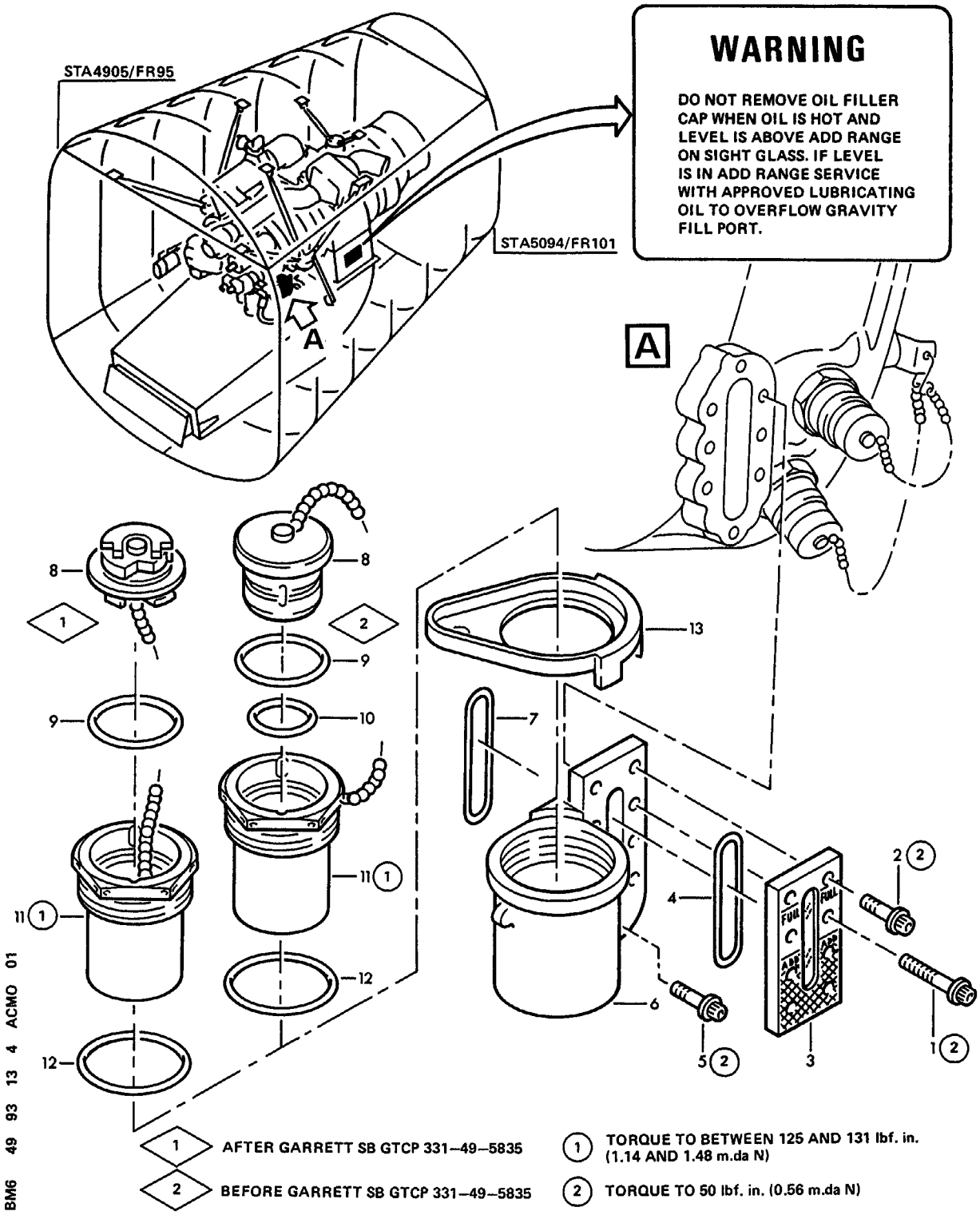
(a)Install new O-rings (9, 10) or O-ring (9) onto cap (8).

(b)Install new O-ring (12) on filler screen (11).

D. Installation

(1)Lubricate new O-rings (4, 7) with oil (Mat. No. 03-002 or 03-003).

(2)Position new O-ring (7) and filler and sight glass housing (6) and



Oil Filler and Sight Glass Housing
Figure 402

install bolt (5).
(3)Position new O-ring (4) and sight glass housing (3) and install bolts (1, 2).
NOTE : Make certain, that the components of sight glass housing assembly are positioned in correct sequence.
(a)TORQUE bolts (1, 2, 5) to 0.56 m.daN (50 lbf.in.).
(4)Install filler screen (11) and oil drain scupper (13) onto filler and sight glass housing (6).
(a)TORQUE filler screen (11) to between 1.41 and 1.48 m.daN (125 and 131 lbf.in.).
(5)Install cap (8).
NOTE : Cap (8) must be depressed during rotation.
(6)Safety filler screen (11) with lockwire.
(7)Replenish oil system (Ref. 49-90-00, P. Block 301).
(8)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
** ON ALL A/C

E. Test
(1)Start and operate APU (Ref. 49-10-00, P. Block 501).
(a)Check magnetic/drain plug for leaks.
(b)Check oil filler and sight glass housing for leaks.
(2)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Open safety and tag circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)Check oil level. Replenish, if necessary (Ref. 49-90-00, P. Block 301).
(3)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(4)Close access doors 315AL and 316AR and remove access platform.
(5)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

OIL QUANTITY SENSOR - REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

1. Reason for the Job

A. Scheduled Maintenance

B. Comparison Check between Indicator and Sight Glass on APU

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Cap and Plugs
C.	Circuit Breaker Safety Clips and Tags
D.	O-Ring
E. Material No. 03-002	Oils (Ref. 20-31-00)
or	
F. Material No. 03-003	Oils (Ref. 20-31-00)
G.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
H.	Torque Wrench, up to 88.5 lbf.in. (1 m.daN)
Referenced Procedure	
- 49-90-00, P. Block 301	Oil

3. Procedure

(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK/CTL	71KD	B53

(2)Position access platform and open access doors 315AL and 316AR.

(3)Drain oil (Ref. 49-90-00, P. Block 301).

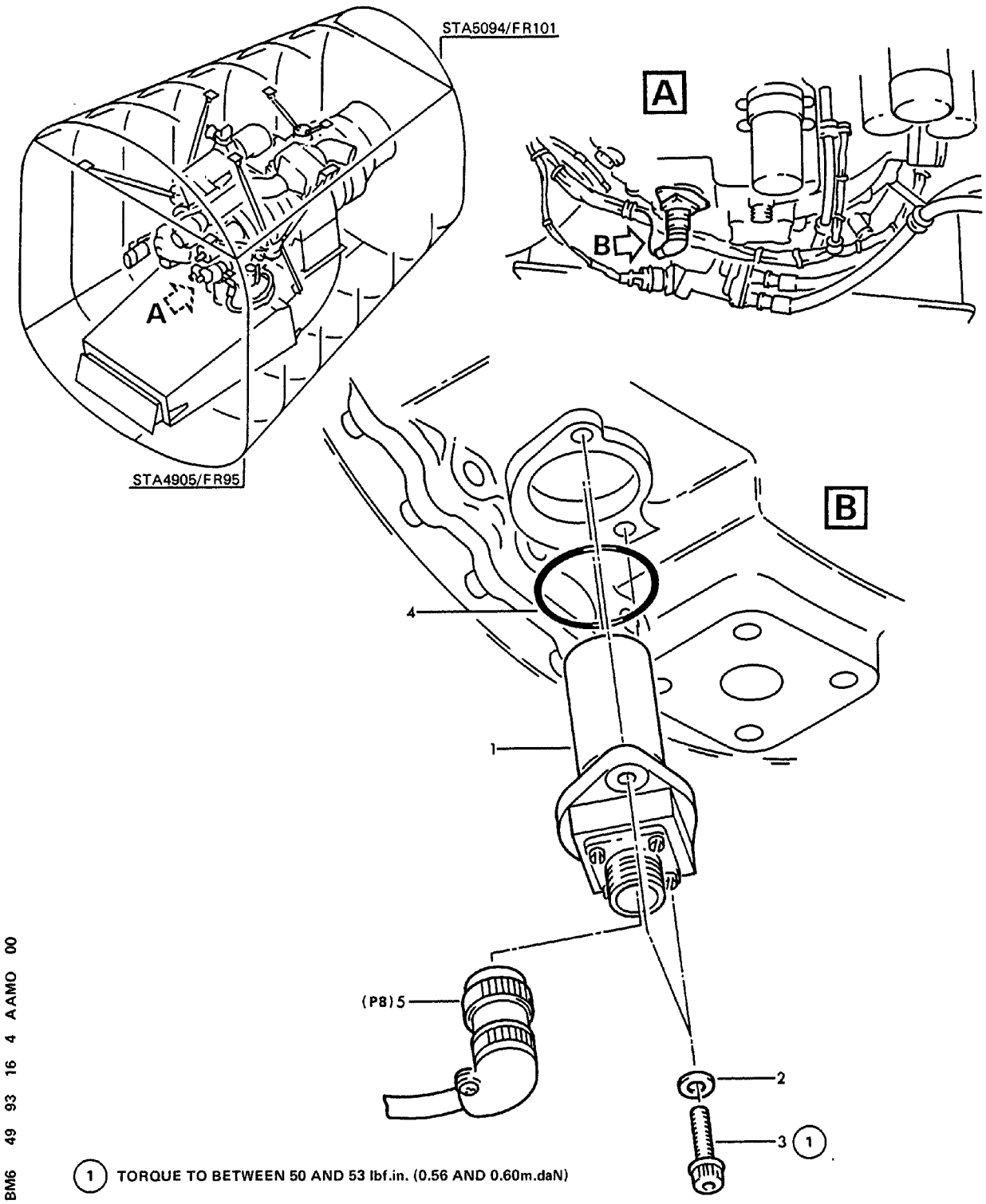
B. Removal

(1)Cut and remove lockwire from connector P8 (5). Disconnect electrical connector P8 (5) and install blanking cap and plug.

(2)Cut and remove lockwire, remove bolts (3), washers (2) and oil quantity sensor (1).

(3)Remove and discard O-ring (4).

(4)Install blanking plug to gearbox orifice.



Oil Quantity Sensor
Figure 401

C. Installation

(1)Apply oil (Mat. No. 03-002 or 03-003) thinly to new O-ring (4). Position new O-ring on sensor (1).
(2)Remove blanking plug, insert oil quantity sensor (1) and install washers (2) and bolts (3).
(3)TORQUE bolts (3) to between 50 and 53 lbf.in (0.56 m.daN and 0.60 m.daN).
(4)Safety bolts (3) with lockwire.
(5)Remove blanking cap and plug and connect electrical connector P8 (5).
(6)Safety connector P8 (5) with lockwire.
(7)Re-fill oil quantity (Ref. 49-90-00, P. Block 301).

D. Test

(1)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.
(2)On APU panel 429VU, place APU MASTER SW to ON position.
R (3)On APU maintenance panel 472VU, verify that the FULL indication on
R the cockpit gauge corresponds with the FULL indication on the
R APU sight glass.
R NOTE : The ADD mark on the APU sight glass corresponds to the
R MIN indication on the cockpit gauge.
(4)On APU panel 429VU, place APU MASTER SW to OFF position.

E. Close-Up

(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.

OIL LEVEL INDICATOR (50KK) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Blanking Cap
B.	Circuit Breaker Safety Clip and Tag

2. Procedure

A. Job set-up

(1) Open, safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/OIL IND QTY	1KK	318/A54

(Ref. Fig. 401)

B. Removal

(1) Unlock the eight quick attach fasteners (1) that attach panel 472VU (2) to structure.
(2) Pull on panel 472VU (2) to extract it and gain access to oil level indicator (3).
(3) Loosen clamp screw (4) sufficiently to make oil level indicator (3) slide.
(4) Disconnect electrical connector (5) from oil level indicator (3) and put a blanking cap.
(5) Remove oil level indicator (3).

C. Installation

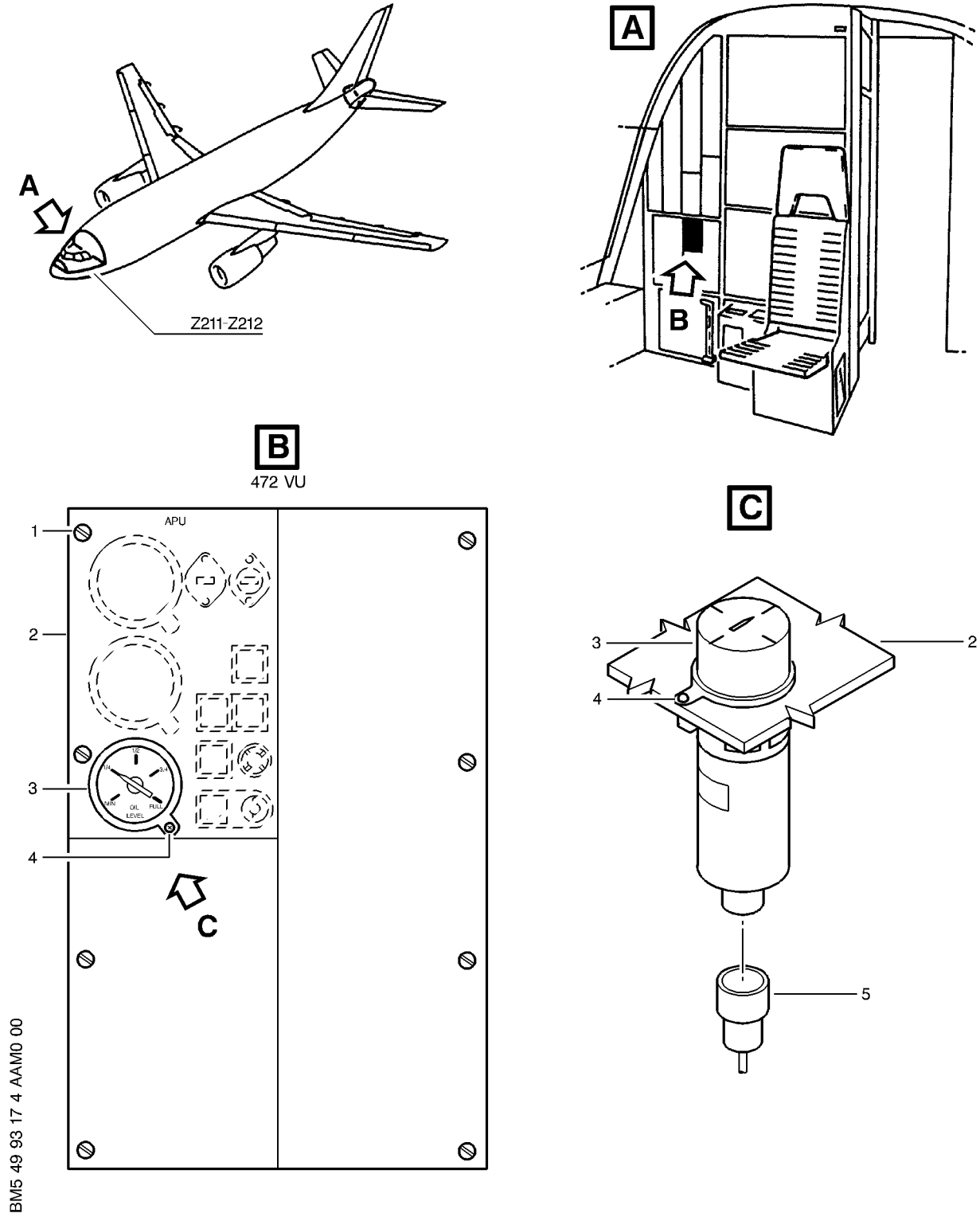
(1) Install oil level indicator (3) in its housing.
(2) Remove blanking cap and connect electrical connector (5) to oil level indicator (3).
(3) Tighten clamp screw (4) to lock oil level indicator (3) in position.
(4) Push on panel 472VU (2).
(5) Lock the eight quick attach fasteners (1) on panel 472VU (2).

D. Test

(1) Remove safety clip and tag and close circuit breaker 1KK.
(2) On overhead panel 429VU, place APU MASTER SW switch in ON position.
(3) On maintenance panel 472VU, make certain that FULL indication on cockpit gauge corresponds to FULL indication on APU sight glass.
NOTE : The ADD mark on APU sight glass corresponds to MIN indication on cockpit gauge.
(4) On overhead panel 429VU, place APU MASTER SW switch in OFF position.

E. Close-up

(1) Make certain that working area is clean and clear of tools and miscel-laneous items of equipment.



Oil Level Indicator (50KK)
Figure 401

LOW OIL PRESSURE AND HIGH OIL TEMPERATURE WARNING
DESCRIPTION AND OPERATION

1. General
   In case of low oil pressure or high oil temperature, a protective shutdown is initiated by the ECB to avoid damaging the APU.

2. Component Location
   (Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	OIL TEMPERATURE SENSOR		315	315AL	
			316	316AR	
	LOW OIL PRESSURE SWITCH		315	315AL	
			316	316AR	
8KD	INDICATION LIGHT	429VU	211		
			212		
59KD	ELECTRONIC CONTROL BOX		251	251JC	49-61-11

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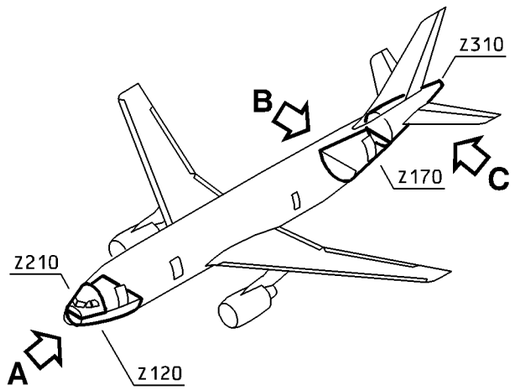

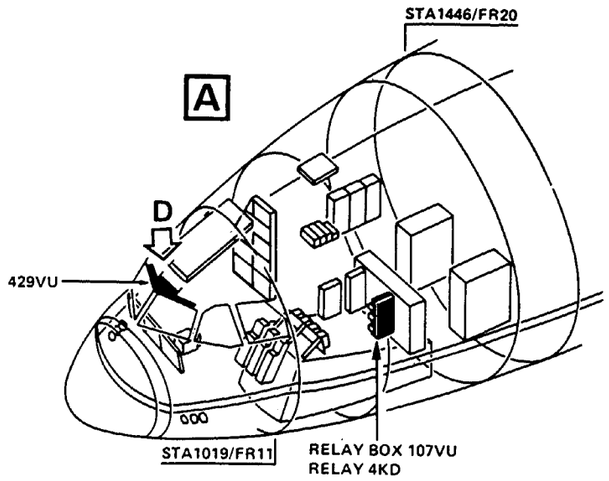

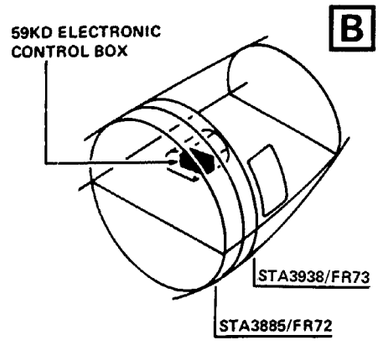

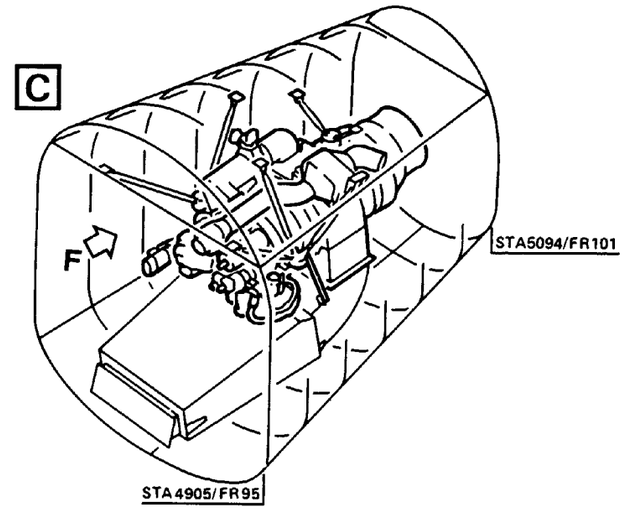

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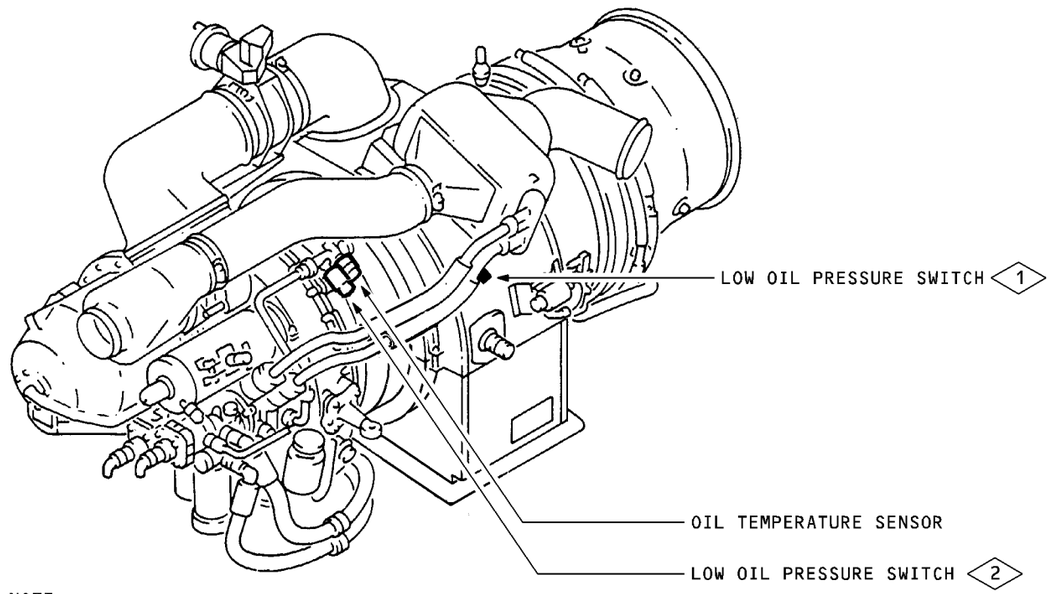

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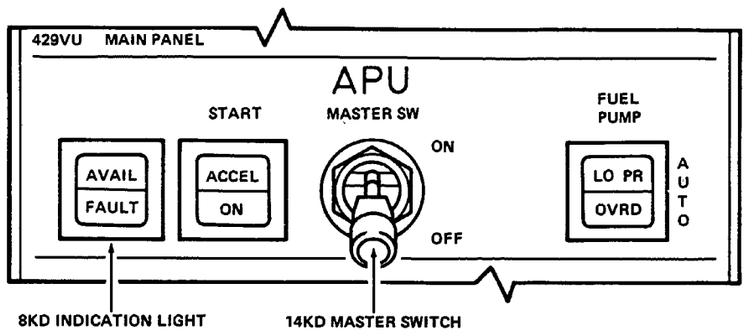


NOTE:

1 AFTER GARRET SB GTCP331-49-5817

2 BEFORE GARRET SB GTCP331-49-5817

BM6 49 94 00 0 ACMD 01

Low Oil Pressure and High Oil Temperature Warning
Figure 001

R

3. Description

** BEFORE GARRET SB GTCP331-49-5817

A. The system consists of a low oil pressure switch (LOP) and a high oil temperature sensor (HOT), installed in the oil sensor manifold assembly.

** AFTER GARRET SB GTCP331-49-5817

A. The system consists of a high oil (HOT), installed in the oil sensor manifold assembly and a low oil pressure switch (LOP) installed to the inlet plenum with flexible plumbing.

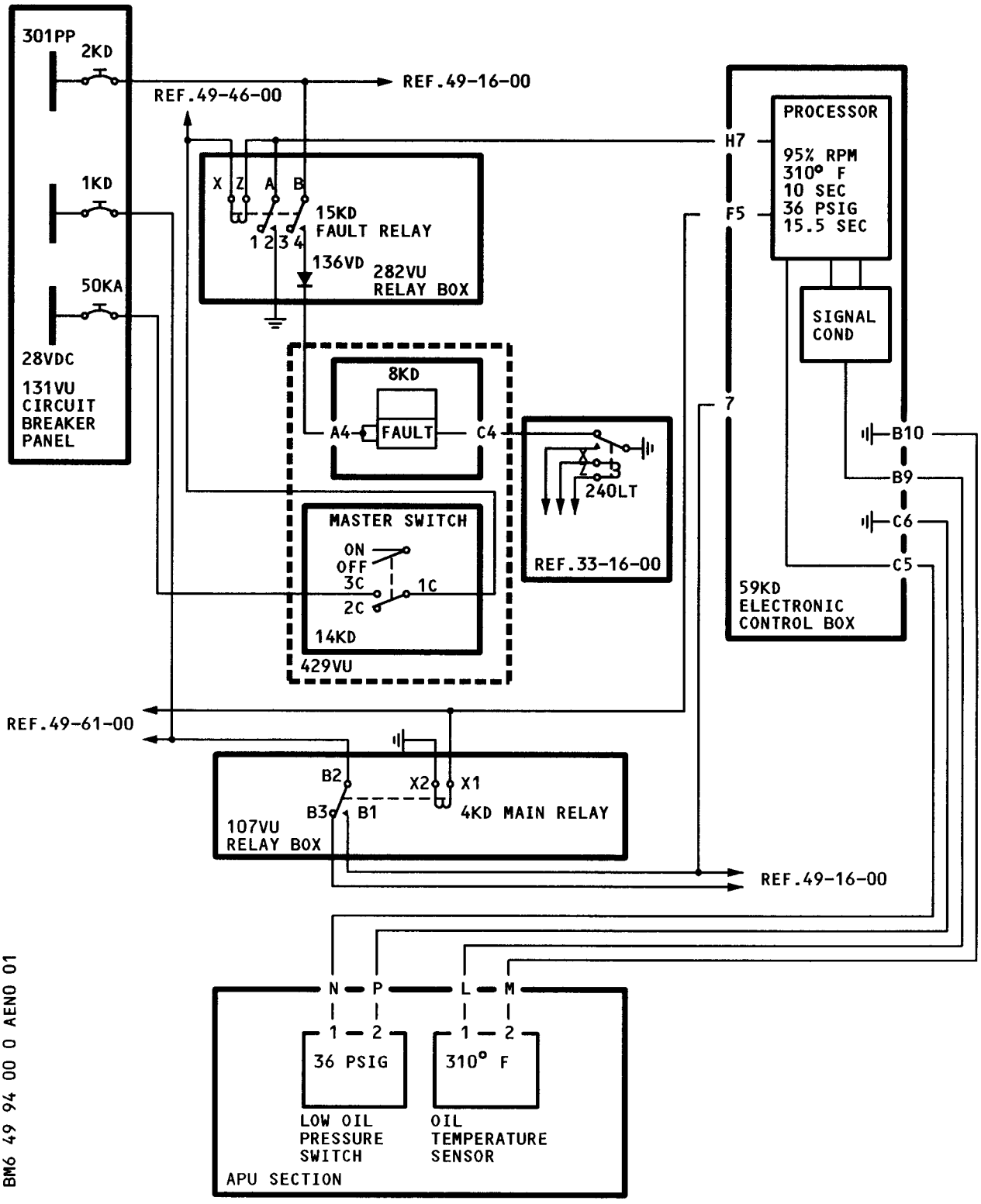
** ON A/C ALL

(1) The LOP switch is normally open and closes whenever oil pressure rises above 35 ±5 psig. When the oil pressure falls below 35 ±5 psig and APU speed is greater than 95 % rpm for more than 15.5 sec, the ECB initiates a protective shutdown (Ref. 49-61-00).
(2) The HOT sensor incorporates a thermal probe in which the resistance of an electrical resistor varies with temperature. Whenever the oil temperature rises to 152 ±4 °C (305 ±7 °F) and APU speed is greater than 95 % for more than 10 sec, the ECB initiates a protective shutdown. (Ref. 49-61-00).

4. Operation
(Ref. Fig. 002)
(Ref. Fig. 003)

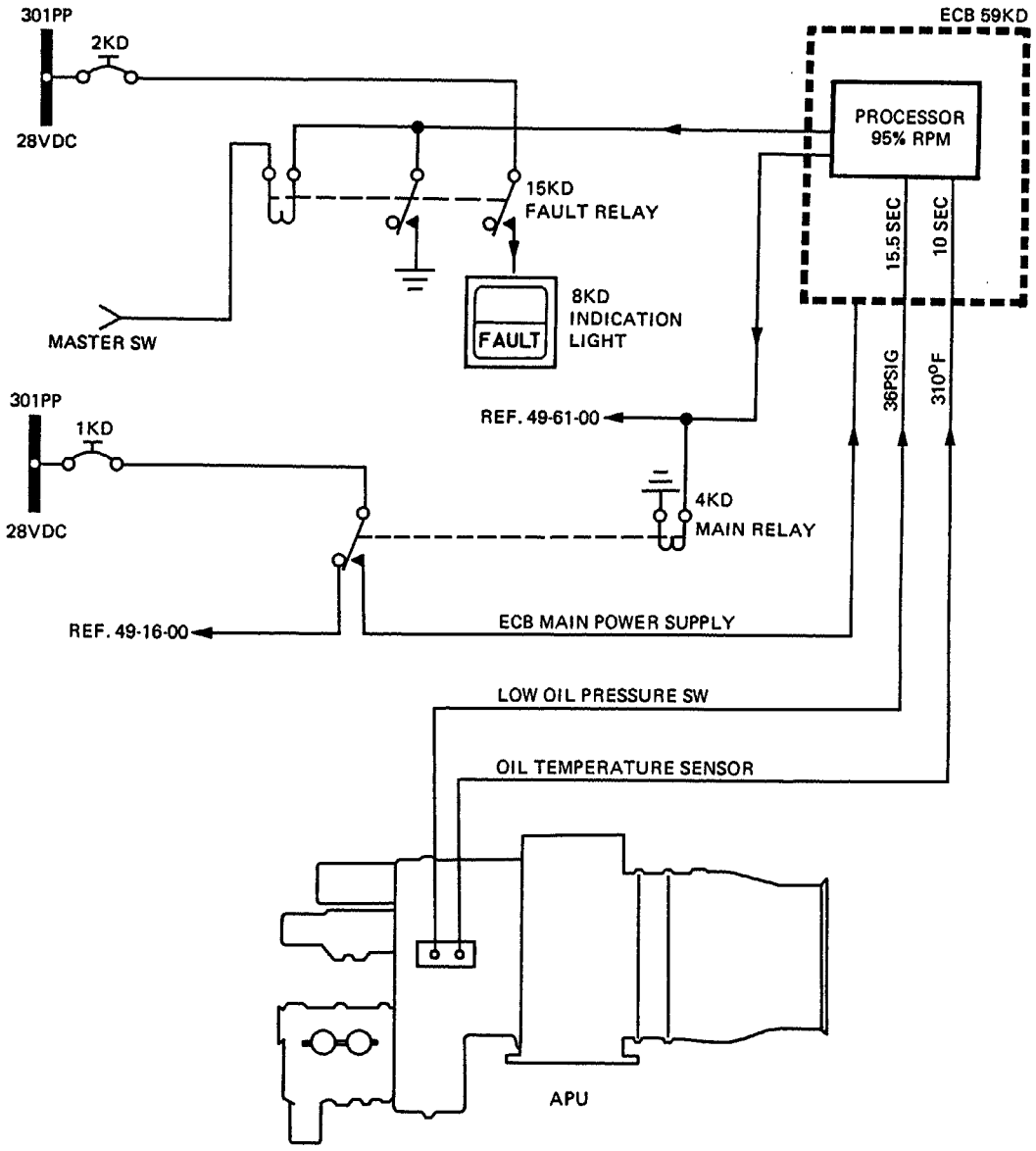
A. With MASTER SW 14KD in ON position and the APU running at 95 %.
(1) If the oil pressure falls to, or below, 35 ±5 psig for more than 15.5 seconds and/or the oil temperature rises to, or above, 152 ±4 °C (305 ±7 °F) for more than 10 seconds, the following actions occur automatically:
(a) The ECB receives a fault signal and initiates an APU protective shutdown (Ref. 49-61-00).
(b) The fault is stored in the ECB.
(c) ECB - BITE DISPLAY MFA comes on.
(d) FAULT legend of indicator light 8KD comes on.
(e) On L ECAM display unit the following message appears:
APU
APU FAULT: AUTO SHUT DOWN
- MASTER SW ..... OFF.
(2) If the FAULT toggle switch on the ECB front panel is placed to the DISPLAY position (Ref. 49-73-00):
(a) The low oil pressure (LOP) display element comes on.
(b) The high oil temperature (HOT) display element comes on.

(c) On main instruments panel
1 MASTER CAUTION lights come on.
(d) A single stroke chime sounds.



Low Oil Pressure and High Oil Temperature
Warning - Schematic
Figure 002

R



BM6 49 94 00 0 AGMO 00

Low Oil Pressure and High Oil Temperature
Warning - Block Diagram
Figure 003

R 1. Oil Sensor Manifold, LOP and HOT Sensor Switch - Removal/Installation

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.

CAUTION : MAKE CERTAIN THAT CLAMP DOES NOT COVER THE AMBIENT HOLE IN THE LOP SWITCH BODY. POSITION OF HOLE IS NOT IMPORTANT.

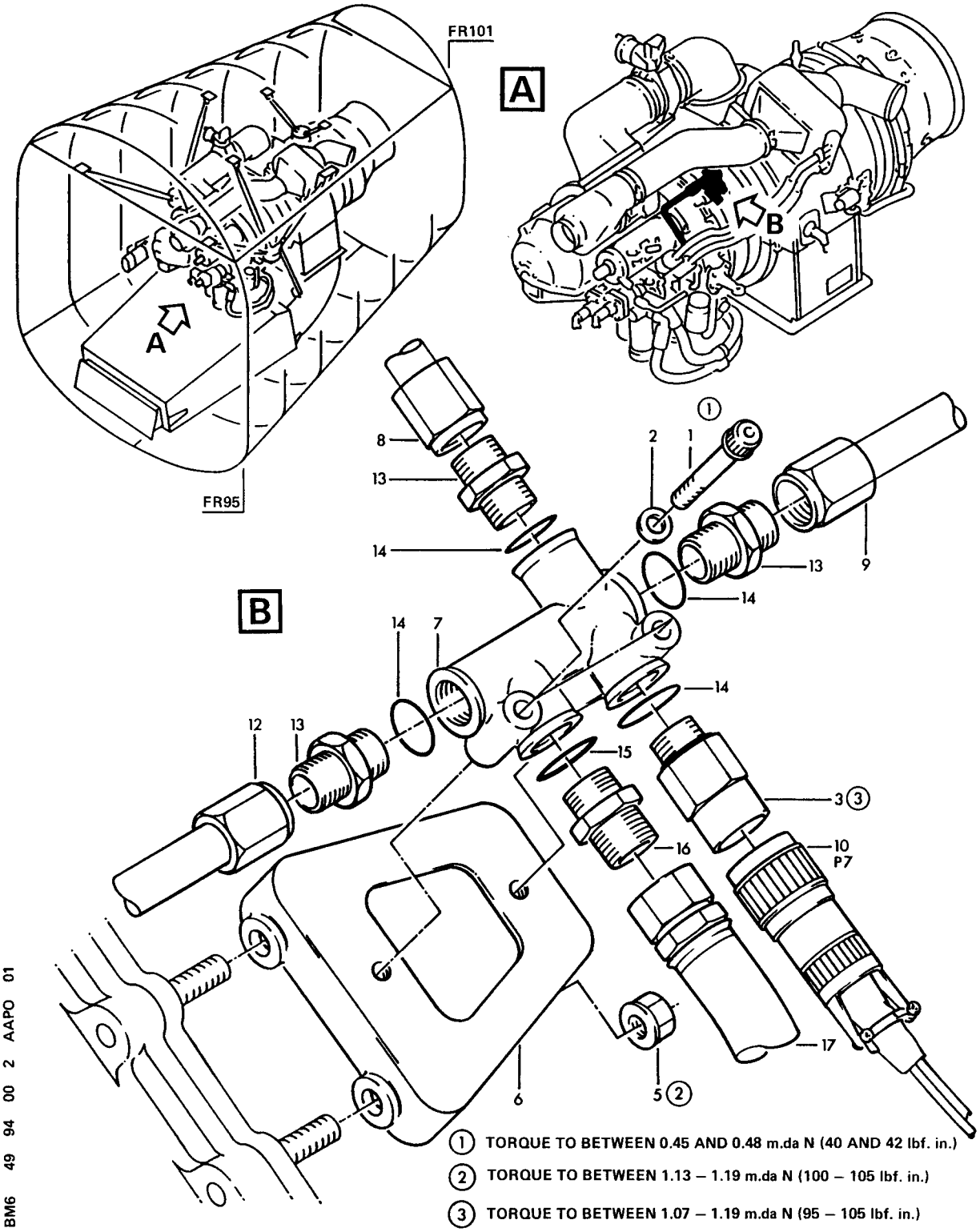
A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 6 m (20 ft.)
(2)	Blanking Caps and Plugs
(3)	Circuit Breaker Safety Clips and Tags
(4)	Torque Wrench, up to 0.56 m.daN (50 lbf.in.)
(5)	Torque Wrench, up to 1.69 m.daN (150 lbf.in.)
(6)	O-Rings
(7)	Corrosion-Resistant Steel Lockwire, 0.8 mm (0.032 in.) dia.
(8)Material No. 03-002	Oils (Ref. 20-31-00)
or	
(9)Material No. 03-003	Oils (Ref. 20-31-00)
(10)	Container

B. Procedure
(Ref. Fig. 201, 202)
(1)Job Set-Up
(a)Open safety and tag the following circuit breakers:

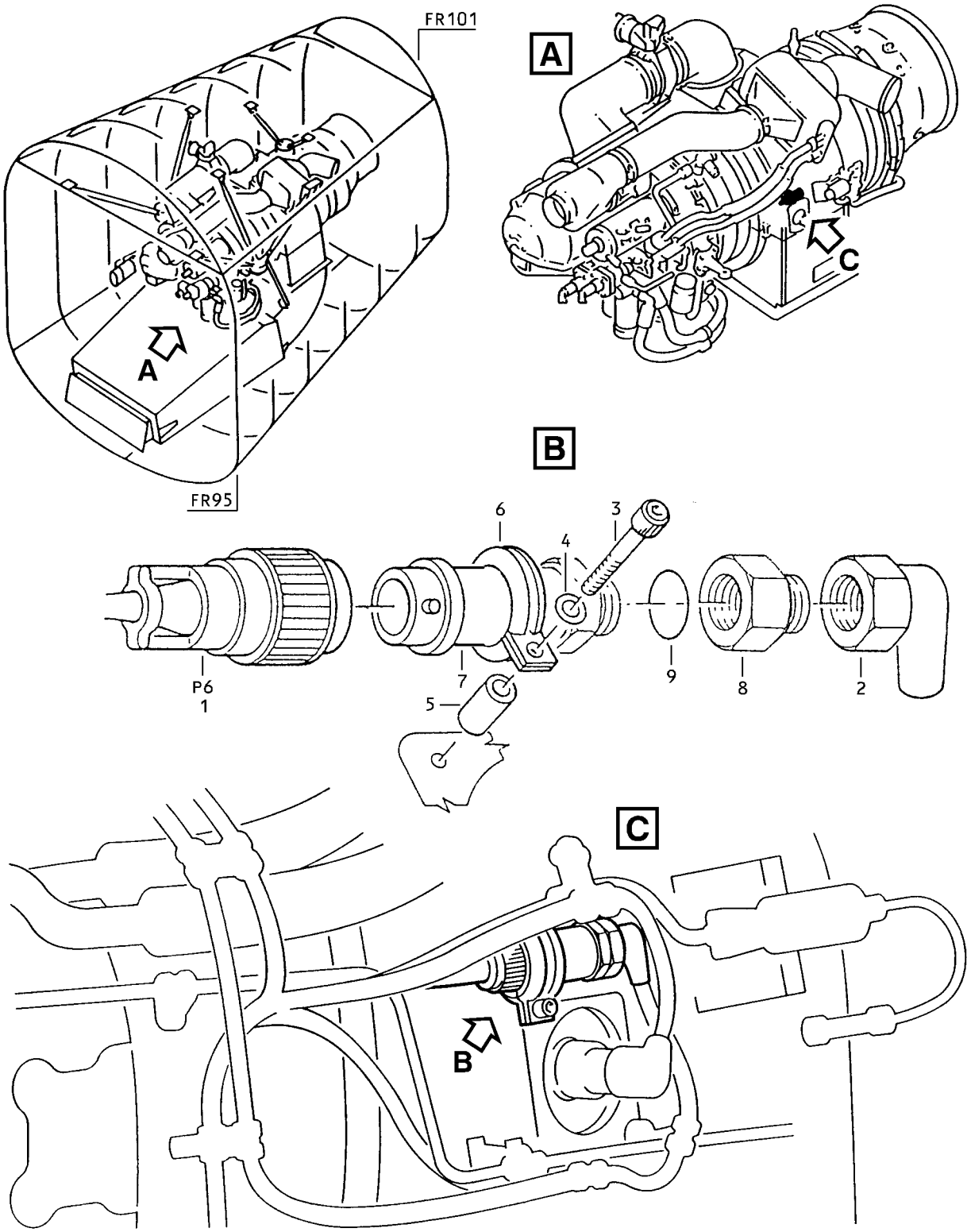
PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(b)Position access platform and open access door 315AL.
R (2)Removal of HOT sensor
NOTE : Fit blanking caps and plugs to all disconnected lines and electrical connectors.
(a)Cut and remove lockwire and disconnect electrical connector (10)
(b)Disconnect oil supply line (12), mid bearing pressure line (9), aft bearing pressure line (8) and oil pipeline (17).
(c)Remove adaptors (13,16).
R (d)Remove HOT sensor (3).
(e)Remove and discard O-rings (14,15).
(f)Remove bolts (1), washers (2) and manifold (7).
(g)Remove nuts (5) and bracket (6) from APU.



Oil Sensor Manifold
Figure 201

R



BM6 49 94 00 2 ACP0 02

Low Oil Pressure Switch
Figure 202

R

(3)Preparation for installation
(a)Inspect bracket (6) for cracks or any other damage.
(b)Inspect hoses and adaptors for damage, replace as required.

R (4)Installation of HOT sensor

NOTE : Remove blanking caps and plugs from all disconnected lines and electrical connectors.

(a)Position bracket (6) on APU and attach with nuts (5).
(b)TORQUE nuts to between 1.13 and 1.19 m.daN. (100 and 105 lbf.in.).
(c)Position manifold (7) and attach with washers (2) and bolts (1).
(d)TORQUE bolts (1) to between 0.45 and 0.48 m.daN. (40 and 48 lbf.in.).
(e)Lubricate new O-rings (14,15) with oil (Mat. No. 03-002 or 03-003).
R (f)Install new O-rings (14,15) onto adaptors (13,16) and HOT sensor (3).
(g)Install adaptors (13,16) into manifold (7).
R (h)Install HOT sensor into manifold (7).
R (j)TORQUE HOT sensor to between 1.07 and 1.19 m.daN (95 and 105 lbf.in.).
(k)Connect oil supply line (12), mid bearing pressure line (9), aft bearing pressure line (8) and oil pipeline (17).
(l)Connect electrical connector (10).
R (m)Safety HOT sensor and electrical connector with lockwire.

R (5)Removal of LOP Switch
(a)Disconnect electrical connector (1).
(b)Disconnect pipeline (2) from adaptor (8).
(c)Remove adaptor (8) and discard O-ring (9).
(d)Remove bolt (3), washer (4), spacer (5), LOP switch and clamp (6).

R (6)Installation of LOP Switch

CAUTION : MAKE CERTAIN THAT CLAMP DOES NOT COVER THE AMBIENT HOLE IN THE LOP SWITCH BODY. POSITION OF HOLE IS NOT IMPORTANT.

(a)Position clamp over LOP switch. Make certain that ambient air hole is not covered by clamp.
(b)Attach LOP switch to APU with bolt (3), washer (4) and spacer (5).
(c)Lubricate new O-ring (9) with oil (Mat. No. 03-002 or 03-003).
(d)Install new O-ring on adaptor (8).
(e)Install adaptor (8) into LOP switch (7).
(f)Connect pipeline (2) to adaptor (8).
(g)Connect electrical connector (1).

(h)Remove safety clips and tags and close circuit breakers 50KA, 1KD, 58KD and 71KD.

R (7)Test
(a)Start and operate APU (Ref. 49-10-00, P. Block 501).
(b)Run APU until oil reaches operating temperature.
(c)Check manifold, fittings, HOT switch and LOP switch for oil leaks.
(d)Shut down APU (Ref. 49-10-00, P. Block 501).

R (8)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close access door 315AL and remove access platform.

OIL TEMPERATURE SWITCH
REMOVAL/INSTALLATION

WARNING : ALLOW APU TO COOL SUFFICIENTLY TO PREVENT PERSONAL INJURY.
MAKE CERTAIN THAT FIRE FIGHTING EQUIPMENT IS AVAILABLE.
WARNING : USE EXTREME CARE WHEN WORKING WITH CLEANING AGENT (MAT. NO. 11-002).
THE SOLVENT VAPORS ARE TOXIC AND FLAMMABLE.
MAKE CERTAIN THAT WORKING AREA IS WELL VENTILATED.
R DO NOT INHALE FUMES. PROTECT EYES AND SKIN.
R USE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

1. Reason for the Job

A. Oil temperature switch inoperative

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 6 m (20 ft.)
B.	Blanking Caps and Plugs
C.	Circuit Breaker Safety Clips and Tags
D.	Container 3.5 l (1 US gal) capacity
E.	Corrosion-Resistant Steel Lockwire, 0.8 mm (0,032 in.) dia.
F.	Torque Wrench, up to 1.0 m.daN (88.5 lbf.in.)
G.	O-rings
H. Material No. 03-002	Oils (Ref. 20-31-00)
or	
J. Material No. 03-003	Oils (Ref. 20-31-00)
K. Material No. 11-002	Cleaning Agents (Ref. 20-31-00)
Referenced Procedures	
- 12-13-49, P. Block 1	APU - Replenishing
- 49-10-00, P. Block 501	Power Plant

3. Procedure (Ref. Fig. 401, 402)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
131VU	APU/ECB BACK UP/SUPPLY	58KD	B52
131VU	APU/ECB BACK UP/CTL	71KD	B53
131VU	APU/START	50KA	B54
131VU	APU/ECB SUPPLY/MAIN	1KD	B57

(2)Position access platform and open access doors 315AL and 316AR.

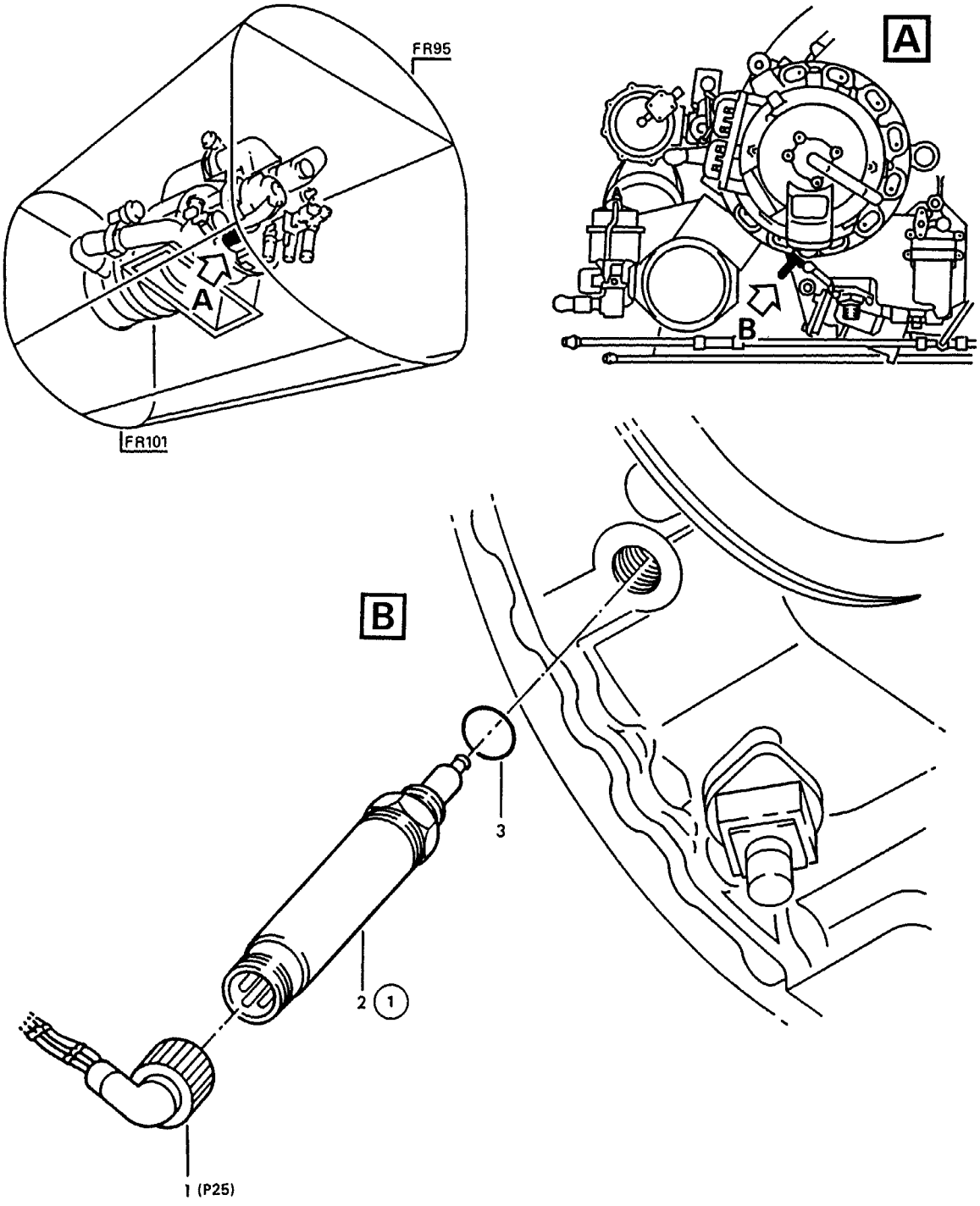
** Switch without adaptor

B. Removal
(1)Remove lockwire from electrical connector P25 (1) and disconnect.
(2)Remove lockwire from oil temperature switch (2).
(3)Position container below oil temperature switch (2).
NOTE : When oil temperature switch (2) is removed, approximately 3.00 l (0.79 US gal) of oil will drain.
(4)Remove oil temperature switch (2) with O-ring (3), from gearbox.
(5)Allow oil to drain into container.
(6)Discard O-ring (3).
(7)Fit blanking caps and plugs to all orifices and electrical connectors.
(8)Remove container. Discard oil.

** Switch with adaptor

B. Removal
(1)Remove lockwire from electrical connector P25 (1) and disconnect.
(2)Remove lockwire from oil temperature switch (2).
(3)Position container below oil temperature switch (2).
NOTE : When oil temperature switch (2) is removed, approximately 3.00 l (0.79 US gal) of oil will drain.
(4)Remove oil temperature switch (2) with O-ring (3), from gearbox.
(5)Allow oil to drain into container.
(6)Discard O-ring (3).
(7)Remove adaptor (4) and discard O-ring (5).
(8)Fit blanking caps and plugs to all orifices and electrical connectors.
(9)Remove container. Discard oil.

C. Preparation for Installation
WARNING : CLEANING AGENT (MAT. NO. 11-002) IS DANGEROUS.
(1)Clean oil temperature switch (2) using cleaning agent (Mat. No. 11-002) and dry compressed air.
(2)Visually inspect oil temperature switch (2) and if fitted, adaptor (4).



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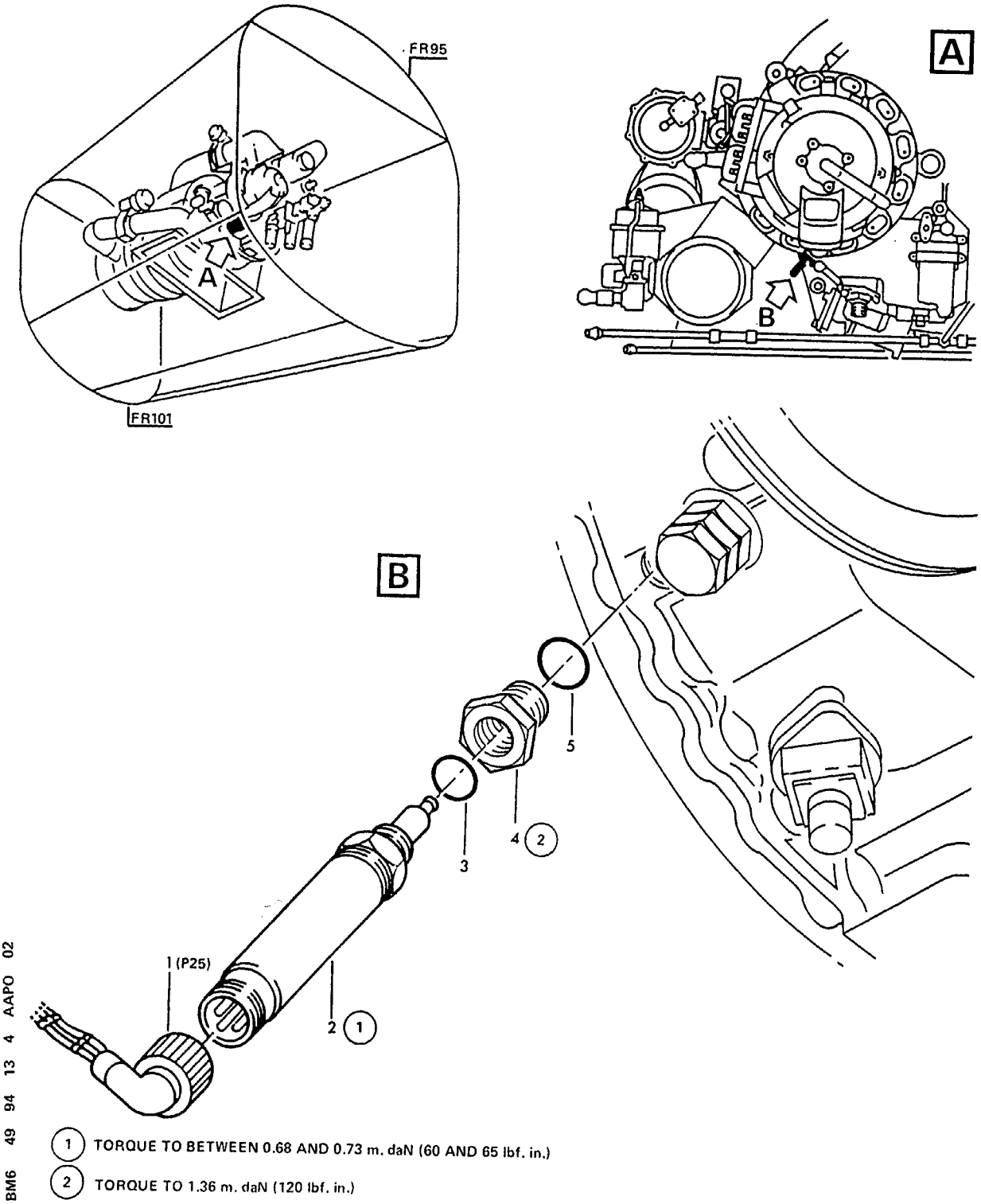
R

Oil Temperature Switch
Figure 401



Oil Temperature Switch with Adaptor
Figure 402

R

** Switch without adaptor

D. Installation
(1)Lubricate new O-ring (3) with oil (Mat. No. 03-002 or 03-003).
(2)Install new O-ring (3) on oil temperature switch (2).
(3)Remove blanking caps and plugs.
(4)Install oil temperature switch (2) into gearbox.
(5)TORQUE oil temperature switch (2) to between 0.68 and 0.73 m.daN. (60 and 65 lbf.in.).
(6)Safety oil temperature switch (2) with lockwire.
(7)Connect electrical connector P25 (1) to oil temperature switch (2) and safety with lockwire.
(8)Replenish oil (Ref. 12-13-49, P. Block 1).

** Switch with adaptor

D. Installation
(1)Remove blanking caps and plugs.
(2)Lubricate new O-ring (5) with oil (Mat. No. 03-002 or 03-003).
(3)Install new O-ring (5) on adaptor (4).
(4)Install adaptor (4) into gearbox.
(5)TORQUE adaptor (4) to 1.36 m.daN. (120 lbf.in.). and safety with lockwire.
(6)Lubricate new O-ring (3) with oil (Mat. No. 03-002 or 03-003).
(7)Install new O-ring (3) on oil temperature switch (2).
(8)Install oil temperature switch (2) into gearbox.
(9)TORQUE oil temperature switch (2) to between 0.68 and 0.73 m.daN. (60 and 65 lbf.in.).
(10)Safety oil temperature switch (2) with lockwire.
(11)Connect electrical connector P25 (1) to oil temperature switch (2) and safety with lockwire.
(12)Replenish oil (Ref. 12-13-49, P. Block 1).

E. Functional Test
(1)Remove safety clips and tags and close following circuit breakers: 50KA, 1KD, 58KD and 71KD.
(2)Start and operate APU with no load (Ref. 49-10-00, P. Block 501).
(3)Check oil temperature switch for leakage.
(4)Shut down APU (Ref. 49-10-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean, and clear of tools and miscellaneous items of equipment.
(2)Close access doors 315AL and 316AR and remove access platform.